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A FORTRAN PROGRAM FOR COMPUTING THE
POLLUTANT STANDARDS INDEX (PSI)

by

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FOREWORD

Monitoring activities provide the most important quantitative information available on the state-of-the-environment, thereby yielding a scientific measure of the impact of environmental regulatory actions. To generate valid monitoring data, research is necessary to evaluate and improve measuring instruments and techniques, develop criteria for designing monitoring networks, carry out effective statistical analyses of monitoring data, and give technical support to field monitoring activities. The Environmental Protection Agency's (EPA's) Office of Research and Development (ORD) carries forward a broadly based national research program in air pollution, water pollution, and other environmental topic areas. Within the ORD, the Office of Monitoring and Technical Support oversees research and policies concerned with monitoring quality assurance, evaluation of measurement methods, application of advanced monitoring techniques, and development of improved methods for analyzing and handling environmental data.

This report is intended to provide technical aids that will assist State and local agencies in computing a nationally uniform air pollution index, the Pollutant Standards Index. Use of this index by air pollution control agencies is covered under regulations that will be promulgated by EPA in August 1978, as required by the Clean Air Act Amendments of 1977 (P.L. 95-95).

ABSTRACT

This report gives full documentation and serves as a user's manual for INDEX.PLOT, a FORTRAN computer program designed to calculate the Pollutant Standards Index (PSI). The PSI was proposed in the Federal Register in September 1976 by the Environmental Protection Agency as a nationally uniform air pollution index and is intended for use by State and local air pollution control agencies under Section 319 of the Clean Air Act. This computer program, which was originally developed to test the structure of PSI, has now been expanded as a general purpose program which can compute daily index values for a month, a season, a year, or longer. The program consists of 563 FORTRAN statements and contains seven specialized subroutines. By use of the subroutines, the main program: lists the raw data, along with any data set labels; inventories missing values in the data set; plots a time series graph of PSI values on the line printer; calculates statistics for PSI (mean, standard deviation, range, coefficients of skewness and kurtosis); and generates and plots a frequency distribution of PSI values, along with cumulative frequencies, on the line printer. A complete listing of the program is given, along with sample outputs and descriptions of each subroutine. This program can be used for describing air quality trends, comparing data from different monitoring stations, and developing environmental quality profiles.

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I. INTRODUCTION

In May 1974, Thom and Ott¹ began a national survey of existing air pollution indices--those in the literature and those used by air pollution control agencies. From the survey findings, they identified the structural characteristics for a nationally uniform air pollution index.^{2,3} In September 1976, the EPA formally adopted a recommended nationally uniform air pollution index based upon this original structure--the Pollutant Standards Index (PSI).^{4,5} The history of the PSI's development, along with examples of its application to data and the theoretical basis for various air and water pollution structures, has been documented in a recent book.⁶

The PSI was intended to be used by State and local air pollution control agencies for reporting air quality data to the public on a daily basis. At that time, although its use by air pollution agencies was completely optional, a number of agencies adopted it.⁷ With passage of the Clean Air Act Amendments of 1977, the PSI has been given greater importance. Section 309 of the Clean Air Act Amendments⁸ requires that a national air quality monitoring system be established using a uniform air quality index.

During the development of the PSI, a special FORTRAN computer program, INDEX.PLOT, was written to evaluate the index and to test the effect of changing various breakpoints. Once the characteristics of the index were finalized, INDEX.PLOT was modified so that it could be used as a general purpose program to calculate the PSI from existing air quality data. A study by Ott and Hunt⁹ used INDEX.PLOT to evaluate the performance of the PSI with air quality data from eight United States cities.

The present report was written to serve as a user's manual for INDEX.PLOT. Thus, it contains the final version of the program, full documentation of the software, and samples of its output with actual air quality data. This computer program is particularly useful for displaying air quality data over relatively long time periods (a month, a season, or a year) or for comparing air quality levels at different monitoring locations. A companion document¹⁰ has been prepared to assist users in rapidly calculating the PSI on a daily basis without a computer. Examples of applications of PSI to data from various United States cities can be found in the literature on this topic.^{6,9,11}

II. STRUCTURE OF THE PROGRAM

The complete program, INDEX.PLOT, is listed in Appendix A. It contains over 700 lines, with 563 FORTRAN statements. Many comments are included internally within the program to assist the user in understanding the program steps or in making changes in the software. The logic of the program is relatively simple and should be easy for the user to follow.

The overall program consists of a main program which calls seven subroutines:

1. TITLE
2. PRINT
3. CHECK
4. PSI
5. TOTAL
6. STAT
7. HISTOG

Each subroutine performs an independent function, although some subroutines depend upon the output from the preceding ones.

The principal function of the main program is to read the data file, storing the information in various arrays. For example, the raw observations of pollutant concentrations are stored by the main program in the two-dimensional array STORE. Once they are stored, the subroutine PRINT lists the raw data so that the user can examine the input values. The subroutine TITLE merely reads and writes out any titles that accompany the raw data. The subroutine CHECK inventories the missing values by pollutant and prints the result in tabular form. Next, the PSI and all its subindices are computed by the PSI subroutine. For each input record, a graphical time series plot of the PSI value, along with the critical pollutant and a descriptor word, is printed on the line printer by the PSI subroutine. This subroutine also counts the number of records for which at least one pollutant is present (i.e., nonmissing records) and stores the result in N. Then the subroutine TOTAL is executed to count the number of different descriptor words for each subindex, including the PSI, and the number of critical pollutants. Next, the subroutine STAT is executed, which

computes basic statistics for the PSI values, such as the mean, standard deviation, coefficients of skewness and kurtosis. Finally, the subroutine HISTOG generates a plot of the histogram of the PSI values on the line printer, along with a listing of the individual and cumulative frequencies. In the present version of the program, the histogram interval width is 5 PSI units, and the full histogram range is $5(100) = 500$ PSI units. Any PSI value which exceeds 500 is listed immediately after the histogram is printed. In the United States, a PSI value above 500 is a very rare occurrence and generally denotes an error.

MAIN Program

The MAIN Program begins by initializing J, which is intended as a counter to count the number of records read ($J = 1$ for the first record). A "record" consists of a line of data, in card image format, with the date and five air pollutants always listed in the following order: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and total suspended particulates (TSP). See Section III for details about the input data format. The vectors LINE(100) and MSUM(7,6) then are cleared, and a code for missing values, Z, is set. In the data read for this example (Appendix C), each missing value is coded as $Z = 999.99$. Of course, Z can be set to any other numerical value, depending upon the coding system established for the data. Missing values must be dealt with in this fashion so that they will not be erroneously treated as zeros and accidentally included in the calculation of the mean and other statistics.

The READ statement then reads values for ITEST (a code for the beginning and end of the file), ID (6 integer values of date: month, day, and year), and STORE (5 floating pollutant values: CO, O_3 , NO_2 , SO_2 , and TSP). If a title is to be read in with the data, the title (not to exceed 80 alphanumeric characters) is inserted in columns 1-80 just before the first data record. This title record must be preceded by a line containing "11" in columns 1-2. Whenever such a line is encountered, $ITEST = 11$ causes the TITLE subroutine to be executed, which reads the title, stores it in LINE(80), and writes it out again. As many title lines as desired may be included before the data, and these will be printed on the first page of the output to assist the user in identifying the run. At the end of all data, a "99" must be entered in column 1-2 to indicate that the end of the file has been reached. When this record is encountered, $ITEST = 99$ causes execution to transfer to Statement #900 of the MAIN Program, and computation begins.

As each data record is read, the pollutant concentrations on the record are stored in the first five "columns" of the two-dimensional array STORE(400,6), with the product $TSP \times SO_2$ stored in the sixth column. Each "row" of this array usually corresponds to a day of the year and, therefore, only the first 365 rows of this array usually are filled. Thus, for the first record (first day of the data set), the five pollutants are stored in STORE(1,k), where $k = 1, 2, \dots, 5$. Next, the product $TSP \times SO_2$ is computed by multiplying STORE(1,4) $\times$ STORE(1,5) and storing the result into STORE(1,6). If either STORE(1,4) or STORE(1,5) contains Z, the code for a missing value, then STORE(1,6) also is set to Z, denoting that the product also is missing. For each record, the PRINT subroutine then is executed.

This subroutine prints the date and the values for six pollutants, including the product. The record counter J is printed also, giving the user an index to facilitate comparison of different dates. As with other parts of the program, not more than 400 records (usually 365 are used to cover a year of data) can be printed. Once the data are printed for a given record, the record counter J is incremented by 1, and execution returns to Statement #1.

FORMAT Statement #100 governs the manner in which the data are read into the program. In the version of the program listed in Appendix A, the concentration data are input as five real values (F7.2 format), beginning at column 22 and separated by one column each. For other data formats, Statement #100 should be modified.

When the end of file code is encountered (ITEST = 99), execution transfers to Statement #900. The actual number of records (days) read is stored in NSUM = J-1. The computations then are carried out from the MAIN Program by executing various subroutines.

In the present version of the program, the units are set manually. If different combinations of units are used in successive runs, the user may wish to modify the input section of the program so that the units can be set automatically on each run from codes contained within the data.

Arrays

The arrays in INDEX.PLOT are used by the MAIN Program and its subroutines for the following purposes:

- LINE(100): Stores the alphanumeric label that identifies each data set. Stores the alphanumeric characters that are used to print each line of the PSI time series plot. Stores the alphanumeric characters that are used to print each line of the histogram.
- XI(100): Stores the abscissa of the histogram, as computed from the subroutine HISTOG.
- JHIST(100): Stores the number of PSI observations per histogram interval, as computed from the subroutine HISTOG.
- PVAL(100): Stores the frequencies of PSI values per histogram interval, as computed from the subroutine HISTOG.
- CUMVAL(100): Stores the cumulative frequencies of PSI values per histogram interval, as computed from the subroutine HISTOG.

- HIVAL(100): Stores any individual PSI values that exceed the range of the histogram, as computed from the subroutine HISTOG.
- STORE(400,6): Stores up to 400 records of raw data (6 pollutants per record) and is filled during execution of the MAIN Program.
- VALUE(400): Stores up to 400 PSI values, as computed in the PSI subroutine. No PSI value is stored in this array if, for any record, all pollutants are missing.
- ID(400,6): Stores up to 400 dates, one for each record in which the date consists of 6 integer values (month, 2 digits; day, 2 digits; year, 2 digits). This array is filled during execution of the MAIN Program.
- IUNITS(5): Stores a code for the units in which the pollutants are expressed, one integer value for each of five pollutants (CO, O₃, NO₂, SO₂, and TSP). Here, ug/m³ is coded as "1"; mg/m³ as "5"; and ppm as "7". These values are established in the MAIN Program.
- MSUM(7,6): Stores the number of PSI values falling into each descriptor category. For MSUM(I,M), I denotes the variable as follows: CO (I=1), O₃ (I=2), NO₂ (I=3), SO₂ (I=4), TSP (I=5), TSP x SO₂ (I=6), PSI (I=7), and M denotes the descriptor category: "Good" (M=1), "Moderate" (M=2), "Unhealthful" (M=3), "Very Unhealthful" (M=4), "Hazardous" (M=5), and "Total" (M=6).
- SUB(7): Stores the six subindex values and the PSI value and is used for temporary storage in subroutine PSI.
- L(400): Stores a code to identify the pollutant with the maximum subindex (i.e., the "critical pollutant"). These codes are determined during execution of the subroutine PSI.
- NC(7): Stores the number of times each critical pollutant appears and is computed in the subroutine TOTAL.

- P(7): Stores the percentage of times that each critical pollutant appears and is computed in the subroutine TOTAL.

The following sections discuss the subroutines and subprograms in INDEX.PLOT. A total of seven subroutines is called by the MAIN Program.

Subprogram BLOCK DATA

The subprogram BLOCK DATA is necessary to store the alphanumeric characters in common storage. For example, MARK1 and MARK2 denote the symbols "*" and "+", respectively, for use in graphing the individual and cumulative frequencies in the histogram generated by the subroutine HISTOG. If the user wishes to change "+" to "C" in this histogram to depict the cumulative frequencies more clearly, he merely changes the symbol within the single quotation marks to read MARK2/'C' /.

Subroutine TITLE

The subroutine TITLE reads and writes out a title which usually occurs at the beginning of each data set just before the data begin. The title can be omitted or included. If it is included, each line of the title must be preceded by a record containing "11" in column 1-2. This code tells the program that the next line is to be read and printed as a title and does not contain data. The title can contain any alphanumeric character but must not exceed 80 characters.

Subroutine PRINT

The subroutine PRINT (J,ID,STORE) prints the input data so that the user can examine his raw data. For each integer value of J, it prints a single line of output containing the date, along with six pollutant concentration values (CO, O₃, NO₂, SO₂, TSP, and TSP x SO₂). The date is printed as six integer characters from the array ID(400,6), and the pollutants are printed as six floating numbers from the array STORE(400,6). The subroutine cannot print more than 400 lines, and the usual data set consists of 365 lines, one for each day of the year.

Subroutine CHECK

The subroutine CHECK (NSUM,STORE,Z) carries out an inventory of missing values in the array STORE(400,6). In the program listed in Appendix A, missing values are coded as Z = 999.99, and, therefore, this subroutine is actually counting up the number of 999.99's in the data set, by pollutant. Because NSUM is the total number of records (i.e., days) available, this subroutine simply goes through the STORE array on a pollutant-by-pollutant basis, counting up the number of missing values. Then, it prints the count for each pollutant. The count for the product TSP x SO₂, since it depends upon the availability of two other pollutants, is not included.

Subroutine PSI

The subroutine PSI (J,N,STORE,VALUE,IUNITS,MSUM,SUB,L) calculates the PSI values. It is called for each individual record (i.e., day). For example, for the first record, J = 1 and each of the six pollutants is obtained from the first row in the STORE array. The CO concentration is obtained from this row as T = STORE(1,1). If T = Z, a missing value for CO has been encountered, and the CO subindex computation is skipped (i.e., GO to 13). If the CO value is present, a test is carried out to determine whether the concentration is expressed in volumetric units, IUNITS(1) = 5, or gravimetric units, IUNITS(1) = 7. If the concentration is in gravimetric units (mg/m³ for CO), the top portion of the program is executed (beginning at Statement #11). If the concentration is in volumetric units (ppm), the lower portion of the program is executed (beginning at Statement #12). This general procedure is repeated for all pollutants in the computation section, between Statements #11 and #63 of this subroutine.

After Statement #63 is executed, the results of the computation section are analyzed. The subindex values first are stored in the first six elements of the vector SUB(7). Then, PSI is computed using the AMAX1 function, which determines the maximum of the six elements, and is stored as the seventh element of SUB. By testing to see which of the six subindex values equals PSI in the DO loop ending at Statement #65, the critical pollutant is identified, and a code for the critical pollutant is stored in the array L(400). The codes are as follows:

<u>POLLUTANT</u>	<u>CODE</u>
CO	1
O ₃	2
NO ₂	3
SO ₂	4
TSP	5
TSP x SO ₂	6

The maximum subindex, which is the PSI value, is stored in the array VALUE(400), with the statement VALUE(N) = T. The value of N is a count of the number of valid PSI values stored in this array (i.e., missing values are not included), and N is incremented just before each PSI value is stored.

This subroutine prints the time series graph on the line printer. First, markers in the form of alphabetic characters "I", are stored in the alphanumeric vector LINE(100) at intervals of 20 characters each. This is accomplished by the DO loop ending at Statement #70. Then the

subindices are sorted into the five PSI intervals, and the number of values in each interval is tabulated, by pollutant variable, and stored in the array MSUM(7,6). The seven rows of this array denote the six pollutants plus the PSI value, and the first five columns contain the number of descriptor words in each of the following PSI ranges. (The sixth column is reserved for the totals that are computed later in the subroutine TOTAL).

<u>Interval Code</u>	<u>Descriptor</u>	<u>PSI Value</u>
M = 1	Good	$T \leq 50$
M = 2	Moderate	$50 < T \leq 100$
M = 3	Unhealthful	$100 < T < 200$
M = 4	Very Unhealthful	$200 \leq T < 300$
M = 5	Hazardous	$300 \leq T$

Because each character on the line printer corresponds to 5 PSI units, the PSI values are divided by 5.0, and converted to an integer through the statement $K = \text{IFIX}(T/5.0)$. For any subindex that exceeds 100, an alphabetic pollutant character is inserted at the appropriate point in the vector LINE(100); that is, in LINE(K). The pollutant characters that are inserted are as follows:

<u>Pollutant Character</u>	<u>Variable</u>	<u>Pollutant</u>
"C"	MARKC	CO
"O"	MARKO	O ₃
"N"	MARKN	NO ₂
"S"	MARKS	SO ₂
"T"	MARKT	TSP
"P"	MARKP	TSP x SO ₂

The pollutant code for the PSI "critical pollutant" is stored in the variable MEM, so it can be printed on the line printer as a time series graph. Five possible formats are used in printing this graph, depending upon the value of MEM (Statements #81, #82, #83, #84, and #85). The format for each statement uses a different descriptor word. Once the vector LINE has been used, it is cleared by setting all of its elements equal to the alphanumeric character for a blank, IBLANK. (These alphanumeric characters

defined earlier in the BLOCK DATA subprogram.) If all subindices have missing values, no PSI values can be calculated, and execution bypasses the analysis section and transfers to Statement #15 at the end of the PSI routine, where FORMAT #220 is executed. This format prints a line of line printer graph in which PSI = 0, and there is no pollutant code and no descriptor word.

routine TOTAL

The subroutine TOTAL(MSUM,L,NSUM,NC,P) generates summary information about the number of values falling in each PSI descriptor word range, by pollutant. The results are expressed both as integer totals and as percentages. A summary of the critical pollutants also is presented. The results of this subroutine appear in three tables on a single page of output. Before TOTAL is executed, the number of observations by subindex by descriptor word already are stored by the subroutine PSI in the array MSUM(I,M). In this array, I denotes the pollutant code (in which 7 denotes PSI), and M denotes the interval code (for M = 1,2,...,5, as listed in the above table).

The total number of descriptor words for each subindex is first computed and stored in the sixth column (M = 6) of the array MSUM. Then the number of words, by descriptor category, is printed for each subindex. The number of words, by descriptor category for PSI itself, is printed last--from the seventh row of the MSUM array (I = 7). Next, the number of values within each subindex and descriptor category is divided by the total number of values and multiplied by 100 to give a percentage distribution by descriptor word and pollutant. This makes it possible to produce PSI bars (see Section 4) and other frequency plots quite easily.

Finally, the critical pollutant codes stored in the vector L(400) are inventoried by this subroutine. This inventory is accomplished by setting L = L(I) for each record from I = 1 to I = NSUM, inclusive. Then, the number of times that IVAL = 1, IVAL = 2, IVAL = 3, etc. is counted and stored in the first six elements of the vector NC(7) to denote the critical pollutant. IVAL = 7 denotes a missing value. The elements of NC are then summed, the percentages are computed, and the number of values and percentages, by pollutant, are printed.

routine STAT

The subroutine STAT(N,VALUE) is a general subroutine designed to compute standard statistical information for the first N values stored in the array VALUE(400), which contains PSI values. The subroutine computes the following statistics using the following formulas:

Arithmetic Mean

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

Second Moment About the Mean

$$m_2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}$$

Standard Deviation

$$s_2 = \sqrt{m_2}$$

Coefficient of Variation

$$v = \frac{s_2}{\bar{x}}$$

Third Moment About the Mean

$$s_3 = \frac{\sum_{i=1}^n (x_i - \bar{x})^3}{n}$$

Fourth Moment About the Mean

$$s_4 = \frac{\sum_{i=1}^n (x_i - \bar{x})^4}{n}$$

Coefficient of Skewness

$$b_1 = \frac{m_3}{1.5 m_2}$$

Coefficient of Kurtosis

$$b_2 = \frac{m_4}{m_2^2}$$

As indicated by Hahn and Shapiro,¹² the above measures are useful for characterizing the shape of the frequency distribution of any set of observations. Because the first N values stored in the array VALUE(400) usually consist of the PSI values calculated by the subroutine PSI for a year of data, these statistics are helpful in describing the overall features of the distribution of the PSI values computed for the year. Examination of this subroutine will reveal that no special steps are taken to deal with missing values, because only the "nonmissing" PSI values have been stored in the array VALUE.

Subroutine HISTOG

The subroutine HISTOG(INSTR,N,VALUE,BASE,DELTA) partitions the N values contained in the array VALUE(N) into 100 intervals of equal size DELTA. The partitioning begins at the value specified by BASE and ends at the value specified by TOP = (100)(DELTA) + BASE. Thus, the range of the partitioning process is (100)(DELTA) units. Then the subroutine prints a histogram showing the results on the line printer.

This subroutine first tests each value contained in the array VALUE to see if it is zero; if so, it increments IZERO, which counts the total number of zero values. To compensate for FORTRAN decimal conversion error inherent in the IBM system, each number in the array VALUE is incremented by 0.000001. If the incremented number PVALUE is less than BASE, ILOW is incremented, which counts the number of values below the range. If the PVALUE is less than TOP, execution proceeds; if not, IEXCES is incremented, which counts the number of values above the range. If INSTR = 1, and PVALUE exceeds TOP, the (unincremented) value is stored in the array HIVAL so that it can be printed at the end of the histogram.

Sorting is carried out by the DO loop that ends at Statement #25. For each iteration of this loop, SDELTA is incremented by DELTA. Thus, for J = 1, SDELTA = DELTA, and TDELTA = SDELTA + BASE = DELTA + BASE. Then, the subroutine tests to see if PVALUE is less than (LT) TDELTA. If it is not, then PVALUE must still be greater than TDELTA, and execution continues in the loop, thereby incrementing SDELTA again. As soon as this condition is fulfilled; namely, that PVALUE is less than TDELTA, execution transfers out of the loop, because PVALUE must be within the following interval:

$$(TDELTA-DELTA) < PVALUE < TDELTA$$

For example, if the value lies in the second interval, then, for the first iteration (J = 1), PVALUE will not be less than TDELTA and the condition will not be fulfilled. For the second iteration (J = 2), PVALUE will be less than TDELTA = 2(DELTA) + BASE, and the condition will be fulfilled. Thus, JHIST(2) will be incremented, indicating that the value lies in the second interval. If the number of values outside of the range exceeds 100, then an error message is printed suggesting that DELTA be increased. Finally, the number of histogram points are summed by adding all of the elements in JHIST. When combined with the integer count IEXCES, the result will equal the total number of values contained

in JHIST, less those below the BASE. Notice that values less than the BASE are excluded from all histogram computations, such as the calculation of cumulative frequencies. (For INDEX.PLOT, this feature is of little importance, because the BASE is set to zero.) Although zero values are counted separately and the count is stored in IZERO, this count does not affect the histogram operation, and any zero value will be included in the first interval.

The abscissa is created and stored in the vector XI(100) by successively adding DELTA to the BASE. The individual frequencies are computed and stored in the vector PVAL(100), while the cumulative frequencies are stored in the vector CUMVAL(100). Finally, the line printer prints the abscissa, the number of values in each interval, the individual frequencies, a graph of the individual and cumulative frequencies, and the listing of cumulative frequencies for the full 100 intervals.

When the subroutine HISTOG is called from the MAIN Program, the BASE is set to zero, and the interval width automatically is set to 5.0 (BASE = 0.0 and DELTA = 5.0). Consequently, the range always is between 0 and 500, which is generally appropriate for plotting PSI values.

III. RUNNING THE PROGRAM

Input Data

Because the PSI is based on the U. S. National Ambient Air Quality Standards (NAAQS), INDEX.PLOT requires input data in a form consistent with the averaging times used in the NAAQS:

<u>Pollutant</u>	<u>Averaging Time</u>
CO	8-hr Average*
O ₃	1-hr Average
NO ₂	1-hr Average
SO ₂	24-hr Average*
TSP	24-hr Average
TSP x SO ₂	24-hr Average

For CO and SO₂, EPA recommends that the data be specified as "running" averages. For example, each 24-hour period has 24 8-hour CO running average values, one beginning at each hour of the day.

For the pollutants with running averages, the INDEX.PLOT program used the highest average value in any 24-hour period. That is, the highest 8-hour CO concentration of the 24 individual average values was used for the computer run given in Appendix B. The raw data are listed in Appendix C and come from air monitoring activities in Newark, New Jersey, in 1974. Because this format differs from the standard EPA Storage and Retrieval of Aerometric Data (SAROAD) format, EPA sponsored the development of specialized computer software for retrieving air quality data from SAROAD in this format. Users wishing additional information about this software or about INDEX.PLOT should contact Jon Clark, Project Officer, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. This software is documented in a report by Bennett.¹³

*Running average concentration.

The data files for INDEX.PLOT ordinarily are set up as specified in the comments contained in the main program. For the example given in the appendices, a title was used. This title specified the monitoring station code, the city, and the pollutant names and units. As indicated in the above discussion of the main program, a title will be read and printed only if the integer value "11" is specified in columns 1-2 of the record immediately preceding the title record. The title itself, consisting of any alphanumeric characters, is placed on columns 1-80. As many title lines as desired may be used, but each line must be preceded by a record containing "11."

The data then are read according to FORMAT Statement #100. In the present version of the program, each data record contains the date (columns 22-41), listed in the same order discussed above (month, day, year). The dates, which are merely read and then printed, can be omitted, since no computations are performed on them.

At the very end of the data file, a record must be inserted containing "99" in columns 1-2 to indicate that no more data are coming and that computation is ready to begin. Appendix C contains a listing of the raw data file used by the program given in Appendix A to generate the output shown in Appendix B, and the user should refer to this raw data listing in setting up his own data file.

Presentation of Data

The output of INDEX.PLOT consists of seven basic items, each produced by the subroutines described in the previous sections:

1. Title of the data set (if specified)
2. List of the input data (reformatted)
3. Count of the missing values, by pollutant
4. Graphical time series plot of PSI values on the line printer
5. PSI summary tables
6. Statistical results
7. PSI histogram and cumulative frequencies

The first three items are intended only as reference information for the data analyst, while the last four items can be used directly to create figures and visual displays of PSI values. Examples of plots based on the time series output can be found in the PSI computer evaluation conducted by Ott and Hunt⁵ based on data from eight cities and in the book on indices by Ott.⁶ Probably the most useful output of INDEX.PLOT is item #5, the PSI summary tables, which enables the data analyst to generate bar charts of the number (or percentage) of PSI values in each descriptor category. These can be listed for each pollutant or for PSI itself. One

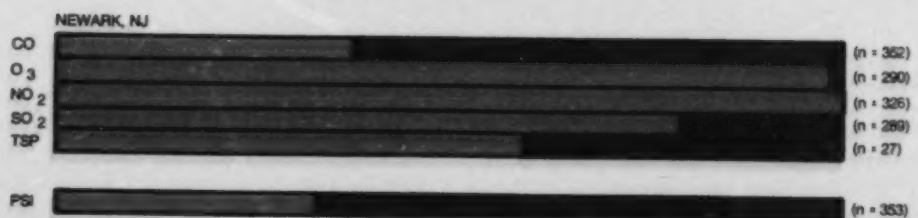
approach is to display each of the PSI subindices on an adjacent bar. If the overall lengths of the bars are identical, with the lengths of shaded areas on each bar corresponding to the proportion of the time period within each descriptor category (i.e., proportion of days in the "good," "moderate," "unhealthful," ranges, etc.), the result is called a "PSI bar." PSI bars are recommended by the author⁶ as a desirable technique for comparing ambient air quality in different cities or at different air monitoring stations.

Figures 1 and 2 show colored PSI bars calculated from the output runs of INDEX.PLOT which originally were used to prepare an article by Ott and Hunt.⁹ These figures also appear in my recent book⁶ on indices, which describes the advantages and possible applications of PSI bars in greater detail. In these two figures, PSI bars have been constructed for five United States cities with relatively complete data sets (Figure 1) and for three United States cities with data sets with many missing values (Figure 2). The colors were selected by Robert Flanagan of EPA's Office of Public Awareness to depict psychologically a gradual worsening of air quality. The goal was to communicate the message with a minimum effort and concentration on the part of the reader. Standard colors (e.g., blue, yellow, orange, and red) were found to be somewhat less effective for this application because they required the reader to "learn" the meaning of each color and, therefore, a "sense" of the severity of the air pollution problem in each city was not perceived automatically or intuitively. It is hoped that PSI users will consider the colors given in Figures 1 and 2 as a possible standard set of colors for reporting PSI descriptor categories to the public. (These colors were described to the printer as follows: "good," 30% PMS process blue; "moderate," 50% PMS process blue and 10% PMS 253 purple; "unhealthful," 50% PMS 253 purple; "very unhealthful," 100% PMS 253 purple.)

The statistical results generated by the program output can be used to summarize PSI values in concise, tabular form, and the histogram plot can be used directly to plot PSI on logarithmic probability paper, or on other types of probability paper. Figure 3, taken from the article by Ott and Hunt,⁹ shows an example of a logarithmic probability plot of PSI values for five United States cities. Readers wishing additional examples of ways to display the PSI, and additional information on the index itself, are advised to consult the literature.^{1-7,9-11}

Program Running Costs

This program was run on the IBM 370 computers that serve EPA through its contract with COMNET in Bethesda, Maryland. The program required 7.54 central processing unit seconds and cost \$4.13 for the example contained in this report. It is expected that the cost of running INDEX.PLOT on data from most United States cities generally will be less than \$5.00 per run.



GOOD
 MODERATE
 UNHEALTHFUL
 VERY UNHEALTHFUL

Figure 1. PSI Bars calculated by the author for five U.S. cities; from 1974 data.

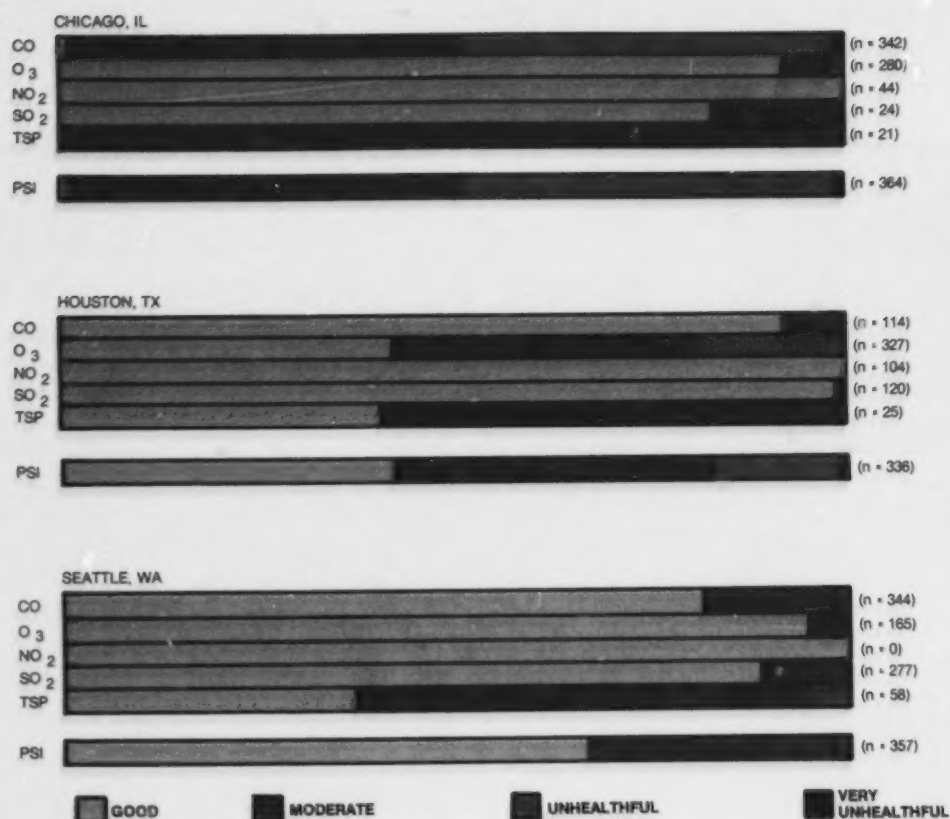


Figure 2. PSI-bars calculated from data sets with many missing values, 1974 data.

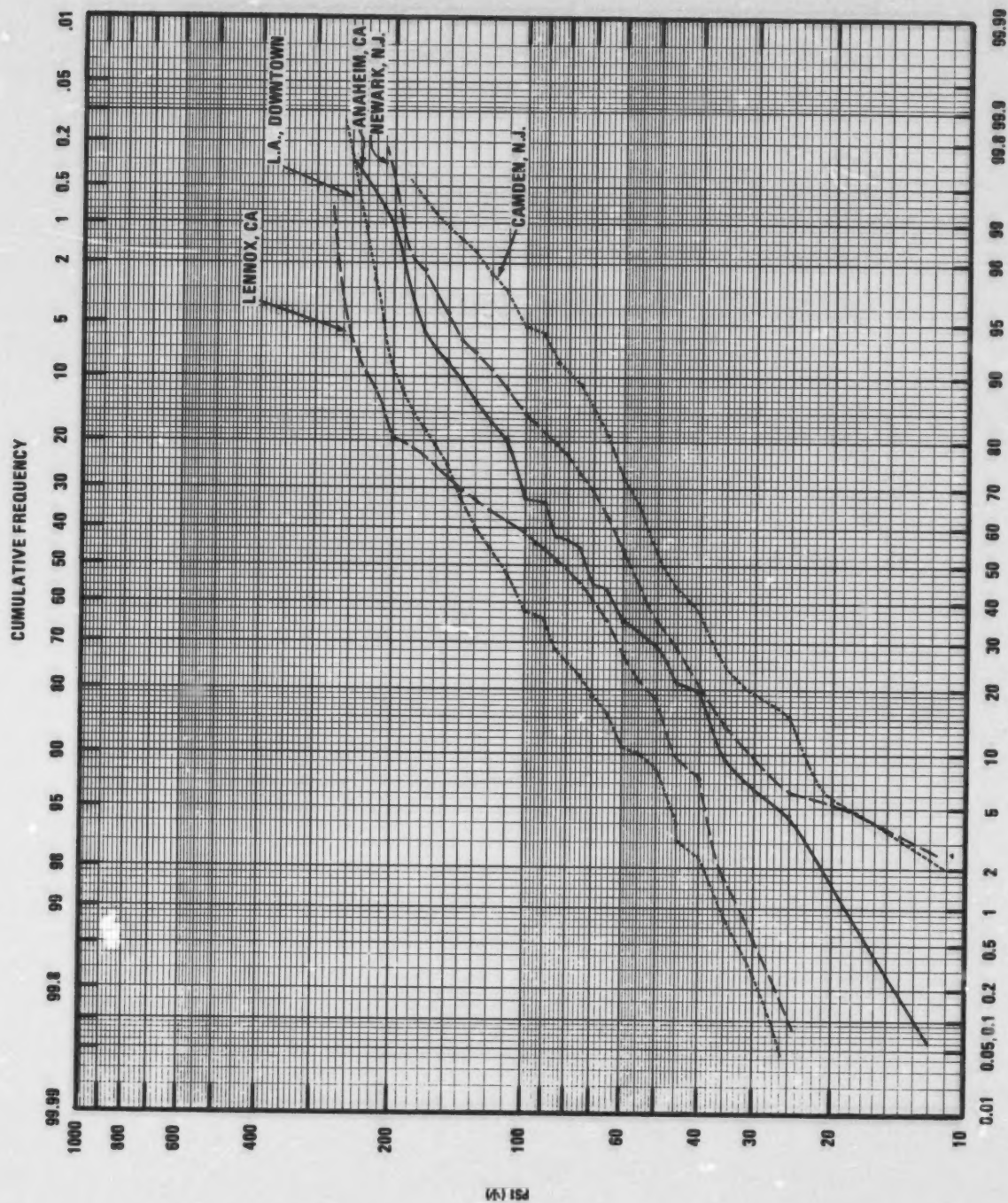


Figure 3. Logarithmic probability plots of PSI for five U.S. cities (Ott and Hunt⁹).

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13. Bennett, John, "Pollutant Standards Index (PSI) Multi-pollutant Retrieval Software," Report by Systems Research and Development Co. for the Council on Environmental Quality and the U.S. Environmental Protection Agency, Research Triangle Park, NC, 1977.

APPENDIX A
PROGRAM LISTING OF INDEX.PLOT

```

C PROGRAM NAME = INSPLOT1 (COMPLETED MARCH 30, 1978)
C PROGRAM IS WRITTEN IN FORTRAN IV AND RUNS ON THE OSI IBM 360/370
C PROGRAMMER IS WAYNE R. OTT
C U.S. ENVIRONMENTAL PROTECTION AGENCY
C PROGRAM IS DESIGNED TO PLOT AND ANALYZE PSI AIR POLLUTION INDEX,
C APPLYING IT TO REAL DATA
C PROGRAM READS FIVE AIR POLLUTANTS PER RECORD (CARD IMAGE FORMAT)
C POLLUTANTS = CO,O3,NO2,SO2,TSP WITH F7.2 FORMATS IN COL 11-60
C SET Z TO THE CODE FOR MISSING VALUES
C A "99" IN COL. 1-2 SHOULD APPEAR AT END OF DATA SET
C INCLUDE DATA SET TITLES BY INSERTING THE 80-CHARACTER TITLE BEFORE
C THE DATA, PRECEDED BY A LINE WITH "11" IN COL. 1-2
C
C
C
C
C *** HOUSEKEEPING SECTION ***
C
COMMON /A/LINE(100),IBLANK,MARKI,MARK1,MARK2
COMMON /B/MARKC,MARKO,MARKN,MARKS,MARKT,MARKP
COMMON /C/XI(100),JHIST(100),PVAL(100),CUMVAL(100)
COMMON /D/HIVAL(100)
DIMENSION STORE(400,6)
DIMENSION VALUE(400)
DIMENSION ID(400,6)
DIMENSION IUNITS(5)
DIMENSION MSUM(7,6),SUB(7),L(400),NC(7),P(7)
C
C INITIALIZE VALUES
C J=1
C N=0
C DO 10 I=1,100
C LINE(I)=IBLANK
10 CONTINUE
C DO 20 K=1,7
C DO 30 M=1,6
C MSUM(K,M)=0
30 CONTINUE
20 CONTINUE
C...SET Z TO DENOTE CODE FOR MISSING VALUES
C Z=999.99
C
C
C *** INPUT SECTION ***
C
C...ID CONTAINS 6 DIGITS OF DATE
C...STORE CONTAINS 6 VARIABLES: CO,O3,NO2,SO2,TSP,SO2 X TSP
1 CONTINUE
C READ(5,100) ITEST,(ID(J,K),K=1,6),(STORE(J,K),K=1,5)
100 FORMAT(I2,13X,6I1,5(1X,F7.2))

```



```

BLOCK DATA
COMMON /A/LINE(100),IBLANK,MARKI,MARK1,MARK2
DATA IBLANK/' ',MARKI/'I ',MARK1/'* ',MARK2/'+ '
COMMON /B/MARKC,MARKO,MARKN,MARKS,MARKT,MARKP
DATA MARKC/'C ',MARKO/'O ',MARKN/'N ',
MARKS/'S ',MARKT/'T ',MARKP/'P '
END

```

```

SUBROUTINE TITLE
C SUBROUTINE TO PRINT IDENTIFICATION TITLE
COMMON /A/LINE(100),IBLANK,MARKI,MARK1,MARK2
READ(5,101) (LINE(I),I=1,80)
WRITE(6,201) (LINE(I),I=1,80)
C...CLEAR ARRAY
DO 10 I=1,80
LINE(I)=IBLANK
10 CONTINUE
101 FORMAT(80A1)
201 FORMAT(1H ,////////,1X,'TITLE OF DATA SET: ',80A1)
RETURN
END

```

```

SUBROUTINE PRINT(J,ID,STORE)
C SUBROUTINE TO PRINT INPUT DATA
DIMENSION ID(400,6),STORE(400,6)
IF(J.EQ.1) WRITE(6,201)
IF(J.GT.400) GO TO 20
WRITE(6,205) J,(ID(J,K),K=1,6),(STORE(J,K),K=1,6)
GO TO 30
20 WRITE(6,210)
201 FORMAT(1H1,16X,'DATE',18X,'CO',8X,'O3',7X,'NO2',7X,'SO2',7X,
1'TSP',9X,'TSPXSO2')
205 FORMAT(1H ,2X,I5,8X,6I1,10X,5F10.2,F15.2)
210 FORMAT(1H0,'ERROR: INPUT DATA SET CONTAINS MORE THAN 400 VALUES')
30 CONTINUE
RETURN
END

```

```

      SUBROUTINE CHECK(NSUM,STORE,Z)
C SUBROUTINE TO INVENTORY MISSING VALUES
      DIMENSION STORE(400,6)
      WRITE(6,201) NSUM
      MCO=0
      MO3=0
      MNO2=0
      MSO2=0
      MTSP=0
      DO 50 I=1,NSUM
C...COUNT CO MISSING VALUES
      IF(STORE(I,1).NE.Z) GO TO 10
      MCO=MCO+1
C...COUNT O3 MISSING VALUES
      10 IF(STORE(I,2).NE.Z) GO TO 20
      MO3=MO3+1
C...COUNT NO2 MISSING VALUES
      20 IF(STORE(I,3).NE.Z) GO TO 30
      MNO2=MNO2+1
C...COUNT SO2 MISSING VALUES
      30 IF(STORE(I,4).NE.Z) GO TO 40
      MSO2=MSO2+1
C...COUNT TSP MISSING VALUES
      40 IF(STORE(I,5).NE.Z) GO TO 50
      MTSP=MTSP+1
      50 CONTINUE
      WRITE(6,202) MCO
      WRITE(6,203) MO3
      WRITE(6,204) MNO2
      WRITE(6,205) MSO2
      WRITE(6,206) MTSP
      201 FORMAT(1H ,//////,2X,'OF',I4,' RECORDS, THE FOLLOWING MISSING VALUE
      18 WERE OBSERVED:',////)
      202 FORMAT(1H0,10X,' CO MISSING VALUES:',I4)
      203 FORMAT(1H0,10X,' O3 MISSING VALUES:',I4)
      204 FORMAT(1H0,10X,' NO2 MISSING VALUES:',I4)
      205 FORMAT(1H0,10X,' SO2 MISSING VALUES:',I4)
      206 FORMAT(1H0,10X,' TSP MISSING VALUES:',I4)
      RETURN
      END

```

```

SUBROUTINE PSI(J,N,STORE,VALUE,Z,IUNITS,MSUM,SUB,L)
C SUBROUTINE TO CALCULATE AND PRINT THE POLLUTANT STANDARDS INDEX (PSI)
  DIMENSION STORE(400,6),IUNITS(5),SUB(7),MSUM(7,6),L(400)
  DIMENSION VALUE(400)
  COMMON /A/LINE(100),IBLANK,MARKI,MARK1,MARK2
  COMMON /B/MARKC,MARKU,MARKN,MARKS,MARKT,MARKP
C...CLEAR VARIABLES
  SUBCO=0.0
  SUBO3=0.0
  SUBNO2=0.0
  SUBSO2=0.0
  SUBTSP=0.0
  S=0.0
C...CALCULATE SUBINDEX FOR CO
  T=STORE(J,1)
  IF(T.EQ.Z) GO TO 13
  IF(IUNITS(1).EQ.5) GO TO 11
  IF(IUNITS(1).EQ.7) GO TO 12
  GO TO 13
C.....CO IN MG/M3:
  11 IF(T.GE.0.0.AND.T.LT.10.0) SUBCO=10.0*T
    IF(T.GE.10.0.AND.T.LT.17.0) SUBCO=14.285714*(T-10.0) + 100.0
    IF(T.GE.17.0.AND.T.LT.34.0) SUBCO=5.8823529*(T-17.0) + 200.0
    IF(T.GE.34.0.AND.T.LT.46.0) SUBCO=8.3333333*(T-34.0) + 300.0
    IF(T.GE.46.0) SUBCO=8.695652*(T-46.0) + 400.0
    GO TO 13
C.....CO IN PPM:
  12 IF(T.GE.0.0.AND.T.LT.9.0) SUBCO=11.111111*T
    IF(T.GE.9.0.AND.T.LT.15.0) SUBCO=16.666667*(T-9.0) + 100.0
    IF(T.GE.15.0.AND.T.LT.30.0) SUBCO=6.666667*(T-15.0) + 200.0
    IF(T.GE.30.0) SUBCO=10.0*(T-30.0) + 300.0
    GO TO 13
C...CALCULATE SUBINDEX FOR O3
  13 T=STORE(J,2)
  IF(T.EQ.Z) GO TO 23
  IF(IUNITS(2).EQ.1) GO TO 21
  IF(IUNITS(2).EQ.7) GO TO 22
  GO TO 23
C.....O3 IN UG/M3:
  21 IF(T.GE.0.0.AND.T.LT.160.0) SUBO3=0.625*T
    IF(T.GE.160.0.AND.T.LT.400.0) SUBO3=.41666667*(T-160.0) + 100.0
    IF(T.GE.400.0.AND.T.LT.800.0) SUBO3=0.25*(T-400.) + 200.0
    IF(T.GE.800.0) SUBO3=0.5*(T-800.0) + 300.0
    GO TO 23
C.....O3 IN PPM
  22 IF(T.GE.0.0.AND.T.LT.0.08) SUBO3=1250.0*T
    IF(T.GE.0.08.AND.T.LT.0.2) SUBO3=833.33333*(T-0.08) + 100.0
    IF(T.GE.0.2.AND.T.LT.0.4) SUBO3=500.0*(T-0.2) + 200.0
    IF(T.GE.0.4) SUBO3=1000.0*(T-0.4) + 300.0
    GO TO 23
C...CALCULATE SUBINDEX FOR NO2
  23 T=STORE(J,3)
  IF(T.EQ.Z) GO TO 33
  IF(IUNITS(3).EQ.1) GO TO 31
  IF(IUNITS(3).EQ.7) GO TO 32
  GO TO 33

```

```

C.....NO2 IN MG/M3
31 IF(T.GE.1130.0,AND,T.LT.2260.0) SUBNO2=.088495575*(T-1130.) + 200.
   IF(T.GE.2260.0,AND,T.LT.3000.0) SUBNO2=.135135135*(T-2260.) + 300.
   IF(T.GE.3000.0) SUBNO2=.133333333*(T-3000.) + 400.
   GO TO 33
C.....NO2 IN PPM
32 IF(T.GE.0.6,AND,T.LT.1.2) SUBNO2=166.666667*(T-0.6) + 200.
   IF(T.GE.1.2) SUBNO2=250.0*(T-1.2) + 300.
   GO TO 33
C...CALCULATE SUBINDEX FOR SO2
33 T=STORE(J,4)
   IF(T.EQ.2) GO TO 43
   IF(IUNITS(4).EQ.1) GO TO 41
   IF(IUNITS(4).EQ.7) GO TO 42
   GO TO 43
41 IF(T.GE.0.0,AND,T.LT.80.0) SUBSO2=0.625000*T
   IF(T.GE.80.0,AND,T.LT.365.0) SUBSO2=.17543860*(T-80.0) + 50.
   IF(T.GE.365.0,AND,T.LT.800.0) SUBSO2=0.229885*(T-365.0) + 100.
   IF(T.GE.800.0,AND,T.LT.1600.0) SUBSO2=0.125*(T-800.0) + 200.0
   IF(T.GE.1600.0,AND,T.LT.2100.0) SUBSO2=0.2*(T-1600.0) + 300.0
   IF(T.GE.2100.0) SUBSO2=0.192308*(T-2100.0) + 400.
   GO TO 43
C.....SO2 IN PPM
42 IF(T.GE.0.0,AND,T.LT.0.03) SUBSO2=1666.66667*T
   IF(T.GE.0.03,AND,T.LT.0.14) SUBSO2=454.545456*(T-0.03) + 50.0
   IF(T.GE.0.14,AND,T.LT.0.3) SUBSO2=625.0*(T-0.14) + 100.
   IF(T.GE.0.3,AND,T.LT.0.6) SUBSO2=333.333333*(T-0.3) + 200.0
   IF(T.GE.0.6) SUBSO2=500.0*(T-0.6) + 300.0
   GO TO 43
C...CALCULATE SUBINDEX FOR TSP (UNITS ALWAYS ARE IN UG/M3)
43 T=STORE(J,5)
   IF(T.EQ.2) GO TO 53
   IF(T.GE.0.0,AND,T.LT.75.0) SUBTSP=.666666667*T
   IF(T.GE.75.0,AND,T.LT.260.0) SUBTSP=0.27027027*(T-75.) + 50.
   IF(T.GE.260.0,AND,T.LT.375.0) SUBTSP=.869565217*(T-260.0) + 100.
   IF(T.GE.375.0,AND,T.LT.875.0) SUBTSP=0.4*(T-375.0) + 200.0
   IF(T.GE.875.0) SUBTSP=0.8*(T-875.0) + 400.0
   GO TO 53
C...CALCULATE SUBINDEX FOR SO2 X TSP
53 T=STORE(J,6)
   IF(T.EQ.2) GO TO 63
   IF(IUNITS(4).EQ.1) GO TO 61
   IF(IUNITS(4).EQ.7) GO TO 62
C.....TSP IN UG/M3 AND SO2 IN UG/M3:
61 IF(T.GE.65000.0,AND,T.LT.261000.0) S=.000510204*(T-65000.0) + 200.
   IF(T.GE.261000.0,AND,T.LT.393000.0) S=.000757576*(T-261000.0)+300.
   IF(T.GE.393000.0) S=0.0010309278*(T-393000.0) + 400
   GO TO 63
C.....TSP IN UG/M3 AND SO2 IN PPM:
62 IF(T.GE.24.82,AND,T.LT.99.66) S=1.3361839*(T-99.66) + 200.
   IF(T.GE.99.66,AND,T.LT.150.1) S=1.9825535*(T-99.66) + 300.
   IF(T.GE.150.1) S=2.702703*(T-150.1) + 400.
63 CONTINUE

```

```

C ANALYZE RESULTS
C...FILL SUBINDEX STORAGE ARRAY
    SUB(1)=SUBCO
    SUB(2)=SUBO3
    SUB(3)=SUBNO2
    SUB(4)=SUBSO2
    SUB(5)=SUBTSP
    SUB(6)=8
    SUB(7)=AMAX1(SUBCO,SUBO3,SUBNO2,SUBSO2,SUBTSP,8)
C...DETERMINE IF ALL SUBINDICES ARE MISSING
    IF(STORE(J,1).EQ.Z.AND.STORE(J,2).EQ.Z.AND.STORE(J,3).EQ.Z.
    1AND.STORE(J,4).EQ.Z.AND.STORE(J,5).EQ.Z) GO TO 15
C...DETERMINE WHICH POLLUTANT IS MAXIMUM
    T=SUB(7)
    DO 65 I=1,6
    IF(SUB(I).EQ.T) L(J)=I
    65 CONTINUE
C...STORE MAXIMUM SUBINDEX
    N=N+1
    VALUE(N)=T
C...INSERT MARKERS
    DO 70 I=20,100,20
    LINE(I)=MARKI
    70 CONTINUE
C...SORT SUBINDICES INTO INTERVALS AND PERFORM SUMMATION BY POLLUTANT
    DO 75 I=1,7
C...SKIP SUMMATION IF THE POLLUTANT IS MISSING
    IF(STORE(J,I).EQ.Z) GO TO 77
    T=SUB(I)
    IF(T.LE.50.0) M=1
    IF(T.GT.50.0.AND.T.LE.100.0) M=2
    IF(T.GT.100.0.AND.T.LT.200.0) M=3
    IF(T.GE.200.0.AND.T.LT.300.0) M=4
    IF(T.GE.300.0) M=5
    MSUM(I,M)=MSUM(I,M)+1
    77 CONTINUE
    IF(I.EQ.7) MEM=M
C...INSERT POLLUTANT CODE INTO LINE VECTOR FOR MAX & SUBINDICES > 100
C...SCALE VALUE
    K=IFIX(T/5.0)
    IF(K.LE.0) K=1
    IF(K.GE.100) K=100
C...INSERT POLLUTANT CODE FOR ALL SUBINDICES > 100, EXCEPT THE MAXIMUM
    IF(T.LT.100.0) GO TO 78
C...INSERT POLLUTANT CODE IN LINE VECTOR
    IF(I.EQ.1) LINE(K)=MARKC
    IF(I.EQ.2) LINE(K)=MARKO
    IF(I.EQ.3) LINE(K)=MARKN
    IF(I.EQ.4) LINE(K)=MARKS
    IF(I.EQ.5) LINE(K)=MARKT
    IF(I.EQ.6) LINE(K)=MARKP
    78 CONTINUE

```

```

C...INSERT POLLUTANT CODE FOR MAXIMUM SUBINDEX
  IF(I.NE.7) GO TO 75
  IF(L(J).EQ.1) LINE(K)=MARKC
  IF(L(J).EQ.2) LINE(K)=MARKO
  IF(L(J).EQ.3) LINE(K)=MARKN
  IF(L(J).EQ.4) LINE(K)=MARKS
  IF(L(J).EQ.5) LINE(K)=MARKT
  IF(L(J).EQ.6) LINE(K)=MARKP
  75 CONTINUE
C...PRINT ONE LINE OF GRAPH OF PSI INDEX
  GO TO (81,82,83,84,85), MEM
  81 WRITE(6,221) J,T,LINE
    GO TO 30
  82 WRITE(6,222) J,T,LINE
    GO TO 30
  83 WRITE(6,223) J,T,LINE
    GO TO 30
  84 WRITE(6,224) J,T,LINE
    GO TO 30
  85 WRITE(6,225) J,T,LINE
  30 CONTINUE
C.....CLEAR LINE VECTOR
  DO 100 I=1,100
    LINE(I)=IBLANK
  100 CONTINUE
    GO TO 20
  15 CONTINUE
C...MISSING VALUE ENCOUNTERED
  T=0.0
  L(J)=7
  WRITE(6,220) J,T
  20 CONTINUE
  220 FORMAT(1X,I3,F7.0,1X,'I',5(19X,'I'))
  221 FORMAT(1X,I3,F7.0,1X,'I',100A1,7X,'GOOD')
  222 FORMAT(1X,I3,F7.0,1X,'I',100A1,5X,'MODERATE')
  223 FORMAT(1X,I3,F7.0,1X,'I',100A1,4X,'UNHEALTHFUL')
  224 FORMAT(1X,I3,F7.0,1X,'I',100A1,2X,'V. UNHEALTHFUL')
  225 FORMAT(1X,I3,F7.0,1X,'I',100A1,4X,'HAZARDOUS')
  RETURN
  END

```

```

      SUBROUTINE TOTAL(MSUM,L,NSUM,P,NC)
      DIMENSION MSUM(7,6),L(400),NC(7),P(7)
C SUBROUTINE TO PRINT DISTRIBUTION OF WORDS BY SUBINDICES
      WRITE(6,210)
      WRITE(6,215)
      WRITE(6,220)
C...COMPUTE SUMS OF SUBINDICES
      DO 100 I=1,7
      DO 110 M=1,5
      MSUM(I,6)=MSUM(I,6)+MSUM(I,M)
110 CONTINUE
100 CONTINUE
C...PRINT DISTRIBUTION OF WORDS FOR SUBINDICES
      WRITE(6,231) (MSUM(1,M),M=1,6)
      WRITE(6,232) (MSUM(2,M),M=1,6)
      WRITE(6,233) (MSUM(3,M),M=1,6)
      WRITE(6,234) (MSUM(4,M),M=1,6)
      WRITE(6,235) (MSUM(5,M),M=1,6)
      WRITE(6,236) (MSUM(6,M),M=1,6)
      WRITE(6,220)
C...PRINT DISTRIBUTION OF WORDS FOR MAIN INDEX
      WRITE(6,237) (MSUM(7,M),M=1,6)
C...PRINT PERCENTAGE DISTRIBUTION OF DESCRIPTOR WORDS BY SUBINDICES
      WRITE(6,240)
      WRITE(6,215)
      WRITE(6,220)
      DO 115 I=1,7
      DO 116 M=1,6
      P(M)=FLOAT(MSUM(I,M))*100.0/FLOAT(MSUM(I,6))
116 CONTINUE
      IF(I.EQ.1) WRITE(6,242) (P(M),M=1,6)
      IF(I.EQ.2) WRITE(6,243) (P(M),M=1,6)
      IF(I.EQ.3) WRITE(6,244) (P(M),M=1,6)
      IF(I.EQ.4) WRITE(6,245) (P(M),M=1,6)
      IF(I.EQ.5) WRITE(6,246) (P(M),M=1,6)
      IF(I.EQ.6) WRITE(6,247) (P(M),M=1,6)
      IF(I.EQ.7) WRITE(6,220)
      IF(I.EQ.7) WRITE(6,248) (P(M),M=1,6)
115 CONTINUE
C...PRINT NUMBER OF OCCURRENCES OF VARIABLES
C...CLEAR COUNTING ARRAY
      DO 120 I=1,7
      NC(I)=0
120 CONTINUE
C...PERFORM COUNT
      DO 122 I=1,NSUM
      IVAL=L(I)
      NC(IVAL)=NC(IVAL)+1
122 CONTINUE
C...COMPUTE SUM--MISSING VALUES, IN NC(7), ARE NOT INCLUDED
      NTOT=0
      DO 124 I=1,6
      NTOT=NTOT+NC(I)
124 CONTINUE
C...COMPUTE PERCENTAGE
      DO 126 I=1,6
      P(I)=FLOAT(NC(I))*100.0/FLOAT(NTOT)
126 CONTINUE

```

```

C...COMPUTE SUM OF PERCENTAGES
  PTOT=0.0
  DO 128 I=1,6
    PTOT=PTOT+P(I)
  128 CONTINUE
C...PRINT SUMMARY OF CRITICAL POLLUTANTS
  WRITE(6,249)
  WRITE(6,250)
  WRITE(6,260)
  WRITE(6,251) NC(1),P(1)
  WRITE(6,252) NC(2),P(2)
  WRITE(6,253) NC(3),P(3)
  WRITE(6,254) NC(4),P(4)
  WRITE(6,255) NC(5),P(5)
  WRITE(6,256) NC(6),P(6)
  WRITE(6,260)
  WRITE(6,258) NTOT,PTOT
  WRITE(6,257) NC(7)
210 FORMAT(1H1,2X,'SUMMARY OF RESULTS BY SUBINDEX AND BY DESCRIPTOR:')
215 FORMAT(//,17X,'GOOD',8X,'MODERATE',5X,'UNHEALTHFUL',
14X,'V. UNHEALTHFUL',3X,'HAZARDOUS',11X,'TOTAL')
220 FORMAT(1H,10X,'-----')
1-----)
231 FORMAT(1H,8X,'CO:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3)
232 FORMAT(1H,8X,'O3:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3)
233 FORMAT(1H,7X,'NO2:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3)
234 FORMAT(1H,7X,'SO2:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3)
235 FORMAT(1H,7X,'TSP:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3)
236 FORMAT(1H,3X,'TSPXSO2:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3,4X)
237 FORMAT(1H0,8X,'P8I:',5X,I3,2(11X,I3),3X,2(11X,I3),16X,I3,/)
240 FORMAT(//,6X,'RESULTS EXPRESSED AS A PERCENTAGE:',/)
242 FORMAT(1H,8X,'CO:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
243 FORMAT(1H,8X,'O3:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
244 FORMAT(1H,7X,'NO2:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
245 FORMAT(1H,7X,'SO2:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
246 FORMAT(1H,7X,'TSP:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
247 FORMAT(1H,3X,'TSPXSO2:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
1)
248 FORMAT(1H0,8X,'P8I:',4X,F5.1,2(9X,F5.1),3X,2(9X,F5.1),14X,F5.1)
249 FORMAT(1H0////,2X,'SUMMARY OF CRITICAL POLLUTANTS (POLLUTANTS FOR
1WHICH SUBINDEX WAS MAXIMUM):',/)
250 FORMAT(1H,8X,'POLLUTANT',4X,'NO. OF VALUES',4X,'PERCENT')
251 FORMAT(1H,11X,'CO',12X,I4,10X,F5.1)
252 FORMAT(1H,11X,'O3',12X,I4,10X,F5.1)
253 FORMAT(1H,11X,'NO2',11X,I4,10X,F5.1)
254 FORMAT(1H,11X,'SO2',11X,I4,10X,F5.1)
255 FORMAT(1H,11X,'TSP',11X,I4,10X,F5.1)
256 FORMAT(1H,9X,'TSPXSO2',9X,I4,10X,F5.1)
257 FORMAT(1H0,9X,'MISSING',10X,I4)
258 FORMAT(1H0,10X,'TOTAL',10X,I4,9X,F6.1)
260 FORMAT(1H,7X,'-----')
RETURN
END

```

```

      SUBROUTINE STAT(N,VALUE)
C SUBROUTINE TO COMPUTE STATISTICAL MOMENTS
      DIMENSION VALUE(400)
      IF (N.EQ.1) GO TO 50
      WRITE(6,198)
C...COMPUTE MEAN
      T=FLOAT(N)
      SUM=0.0
      DO 10 I=1,N
      SUM=SUM+VALUE(I)
10 CONTINUE
      AVE=SUM/T
      WRITE(6,199)
      WRITE(6,200) N
      WRITE(6,199)
      WRITE(6,210) AVE
      WRITE(6,199)
C...COMPUTE OTHER MOMENTS
      SUM2=0.0
      SUM3=0.0
      SUM4=0.0
      DO 20 I=1,N
      D=VALUE(I)-AVE
      Z2=D*D
      Z3=D*Z2
      Z4=D*Z3
      SUM2=SUM2+Z2
      SUM3=SUM3+Z3
      SUM4=SUM4+Z4
20 CONTINUE
C...COMPUTE VARIANCE, STANDARD DEVIATION, AND COEFFICIENT OF VARIATION
      S2=SUM2/(T-1.0)
      STD=SQRT(S2)
      COF=STD/AVE
      WRITE(6,220) S2,STD
      WRITE(6,199)
      WRITE(6,225) COF
      WRITE(6,199)
C...COMPUTE COEFFICIENT OF SKEWNESS
      IF(S2.EQ.0.0) GO TO 50
      S3=SUM3/T
      SKEW=S3/(S2**1.5)
      WRITE(6,230) S3,SKEW
      WRITE(6,199)
C...COMPUTE COEFFICIENT OF KURTOSIS
      S4=SUM4/T
      BETA2=S4/(S2*S2)
      WRITE(6,240) S4,BETA2
      WRITE(6,199)
C...FIND LOWEST AND HIGHEST VALUES
      VMAX=-9999999999.0
      VMIN=9999999999.0
      DO 30 I=1,N
      IF(VALUE(I).LT.VMIN) VMIN=VALUE(I)
      IF(VALUE(I).GT.VMAX) VMAX=VALUE(I)
30 CONTINUE

```

```

WRITE(6,245) VMIN
WRITE(6,199)
WRITE(6,246) VMAX
WRITE(6,199)
GO TO 60
50 CONTINUE
WRITE(6,250)
250 FORMAT(1H ,5X,'NO ADDITIONAL STATISTICS POSSIBLE')
60 CONTINUE
198 FORMAT(1H1)
199 FORMAT(1H0)
200 FORMAT(1H0,5X,'N =',I8)
210 FORMAT(1H0,5X,'MEAN =',F18,8)
220 FORMAT(1H0,5X,'2ND MOMENT (VAR.) =',F22.10,12X,'STANDARD DEV. =',
1F20,9)
225 FORMAT(1H0,10X,'COEFFICIENT OF VARIATION =',F15,8)
230 FORMAT(1H0,5X,'3RD MOMENT =',F20.9,9X,'COEF. OF SKEWNESS =',F15,8)
240 FORMAT(1H0,5X,'4TH MOMENT =',F20.9,9X,'COEF. OF KURTOSIS =',F15,8)
245 FORMAT(1H0,5X,'LOWEST VALUE =',F18,8)
246 FORMAT(1H0,5X,'HIGHEST VALUE =',F18,9)
RETURN
END

```

```

SUBROUTINE HISTOG(INSTR,N,VALUE,BASE,DELTA)
C THIS SUBROUTINE SORTS EACH OF N VALUES INTO INTERVALS OF SIZE DELTA
C IF INSTR=1, THE VALUES ABOVE THE RANGE ARE LISTED
C...XI CONTAINS THE HISTOGRAM ABSCISSA
C...PVAL CONTAINS THE INDIVIDUAL FREQUENCIES
C...CUMVAL CONTAINS THE CUMULATIVE FREQUENCIES
C...ILOW IS THE NUMBER OF VALUES BELOW THE RANGE
C...IZERO IS THE NUMBER OF ZERO VALUES
C...IEXCES IS THE NUMBER OF VALUES ABOVE THE RANGE
C...HIVAL CONTAINS THE INDIVIDUAL VALUES ABOVE THE RANGE
DIMENSION VALUE(400)
COMMON /A/LINE(100),IBLANK,MARKI,MARK1,MARK2
COMMON /C/XI(100),JHIST(100),PVAL(100),CUMVAL(100)
COMMON /D/HIVAL(100)
C CLEAR ARRAYS
DO 1 I=1,100
JHIST(I)=0
PVAL(I)=0.0
XI(I)=0.0
CUMVAL(I)=0.0
1 CONTINUE
C...CLEAR VALUES
ILOW=0
IZERO=0
IEXCES=0
C...SET TOP OF RANGE
TOP=100.*DELTA + BASE

```

```

C BEGIN SORTING ROUTINE
  DO 10 I=1,N
C...DETERMINE IF POINT IS A ZERO VALUE
  IF (VALUE(I).EQ.0.0) IZERO=IZERO+1
C...MODIFY VALUE TO ADJUST FOR MACHINE DECIMAL CONVERSION ERROR
  PVALUE=VALUE(I) + 0.000001
C...DETERMINE IF POINT IS BELOW RANGE
  IF(PVALUE.GE.BASE) GO TO 15
  ILOW=ILOW+1
  GO TO 10
15 CONTINUE
C...DETERMINE IF POINT IS ABOVE RANGE
  IF(PVALUE.LT.TOP) GO TO 20
  IEXCES=IEXCES+1
  IF(IEXCES.GT.1000) GO TO 28
  IF(INSTR.EQ.1) HIVAL(IEXCES)=VALUE(I)
  GO TO 10
20 CONTINUE
C...POINT IS WITHIN RANGE; CARRY OUT SORTING
  SDELTA=0.0
  DO 25 J=1,100
    SDELTA=DELTA+SDELTA
    TDELTA=SDELTA+BASE
    IF(PVALUE.LT.TDELTA) GO TO 27
25 CONTINUE
27 CONTINUE
C PVALUE IS GE THAN VALUE(I); THEREFORE INTERVAL HAS BEEN FOUND;
  JHIST(J)=JHIST(J)+1
  GO TO 10
28 CONTINUE
C ERROR: NUMBER OF POINTS ABOVE RANGE EXCEEDS ARRAY SIZE
  IF(IEXCES.EQ.1001) WRITE(6,2099)
2099 FORMAT(1H1,2X,'TOO MANY POINTS ARE OUTSIDE RANGE; INCREASE DELTA')
  GO TO 10
C TOTAL HISTOGRAM POINTS (THOSE ABOVE BASE)
  NUM=0
  DO 30 I=1,100
    NUM=NUM+JHIST(I)
30 CONTINUE
  NUM=NUM+IEXCES
  S=FLOAT(NUM)
C FILL ABSCISSA, INDIVIDUAL, AND CUMULATIVE FREQUENCY VECTORS
  SUM=0.0
  DO 40 I=1,100
    XI(I)=(FLOAT(I))*DELTA+BASE
    PVAL(I)=(FLOAT(JHIST(I))*100.0)/S
    SUM=SUM+PVAL(I)
    CUMVAL(I)=SUM
40 CONTINUE
C CLEAR LINE ARRAY
  DO 50 K=1,50
    LINE(K)=IBLANK
50 CONTINUE
C PRINT RESULTS
  WRITE(6,1999)
  WRITE(6,2000) DELTA
  WRITE(6,2001) BASE,ILOW,IZERO
  WRITE(6,2002)

```

```

DO 60 I=1,100
Z=PVAL(I)+0.5
M=IFIX(Z)
IF(M.EQ.0) GO TO 80
IF(M.GT.50) M=50
C...FILL LINE ARRAY WITH INDIVIDUAL FREQUENCIES
DO 70 J=1,M
LINE(J)=MARK1
70 CONTINUE
80 CONTINUE
C...FILL LINE ARRAY WITH CUMULATIVE FREQUENCIES
Q=(CUMVAL(I)/2.)+0.5
L=IFIX(Q)
IF(L.NE.0) LINE(L)=MARK2
C...PRINT ONE LINE
A=XI(I)-DELTA
B=XI(I)
IC=JHIST(I)
D=PVAL(I)
E=CUMVAL(I)
IF(DELTA.LT.0.1) WRITE(6,2003) A,B,IC,D,(LINE(K),K=1,50),E
IF(DELTA.GE.0.1) WRITE(6,2004) A,B,IC,D,(LINE(K),K=1,50),E
C...CLEAR LINE ARRAY
IF(M.EQ.0) GO TO 90
DO 90 K=1,M
LINE(K)=IBLANK
90 CONTINUE
IF(L.NE.0) LINE(L)=IBLANK
C...CHANGE PAGE
IF(I.NE.50) GO TO 60
WRITE(6,2005)
WRITE(6,1999)
WRITE(6,2002)
60 CONTINUE
C...PRINT BOTTOM OF GRAPH
WRITE(6,2005)
C...PRINT NO. OF VALUES ABOVE RANGE
PEXCES=(FLOAT(IEXCES)/8)*100.0
TOP=XI(100)
WRITE(6,2006) TOP,IEXCES,PEXCES
1999 FORMAT(1H1)
2000 FORMAT(1H0,22X, ' * * * DISTRIBUTION OF DATA (INTERVAL WI
10TH =',F8.4,') * * *')
C...IF INSTR=1, PRINT VALUES ABOVE THE RANGE
IF(INSTR.NE.1) GO TO 110
IF(IEXCES.EQ.0) GO TO 110
IF(IEXCES.GT.1000) GO TO 110
WRITE(6,2007)
DO 100 I=1,IEXCES
WRITE(6,2008) I,HIVAL(I)
100 CONTINUE
110 CONTINUE
2001 FORMAT(1H0,2X,'NO. OF VALUES LESS THAN ',F8.4,'=',I6,5X,
1'NO. OF ZERO VALUES =',I6)
2002 FORMAT(1H0,5X,'INTERVAL',5X,'NUMBER',3X,'PERCENT',
12X,'+-----HISTOGRAM-----+',
21X,'CUM. FREQ. ')
2003 FORMAT(1H,1X,F7.4,'=',F7.4,1X,I7,2X,F7.3,
1'X',2X,'I',50A1,'I',1X,F7.3,'X')

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```

2004 FORMAT(1H ,1X,F7.2,'-',F6.2,1X,I8,2X,F7.3,
1'X',2X,'I',50A1,'I',1X,F7.3,'X')
2005 FORMAT(1H ,36X,'+-----
1-+')
2006 FORMAT(1H0,2X,'NO. OF VALUES EQUAL TO OR GREATER THAN ',F9.4,
1' ',I5,2X,'( ',F6.3,'X)')
2007 FORMAT(1H1,///,8X,'LISTING OF VALUES ABOVE RANGE:',//)
2008 FORMAT(1H0,12X,I4,5X,F14.6)
      RETURN
      END

```

APPENDIX B

SAMPLE OUTPUT OF INDEX.PLOT USING
DATA FROM NEWARK, NEW JERSEY, 1974

TITLE OF DATA SET: 313480002P01 NEWARK NJ CU=HC/H3 OX=PPH NO2=PPH S02=UG/H3 TSP=UG/H3

DATE	CO	O3	NO2	SO2	TSP	TSPX802
010174	2.40	0.0	0.04	64.00	999.99	999.99
010274	5.10	0.01	0.04	34.00	999.99	999.99
010374	7.70	0.02	0.07	999.99	999.99	999.99
010474	4.30	999.99	999.99	999.99	999.99	999.99
010574	6.50	0.01	0.06	79.00	999.99	999.99
010674	4.30	0.01	0.04	148.00	999.99	999.99
010774	6.80	0.01	0.05	142.00	999.99	999.99
010874	6.70	0.01	0.04	45.00	999.99	999.99
010974	4.40	0.01	0.05	104.00	999.99	999.99
011074	5.60	0.01	0.05	112.00	999.99	999.99
011174	12.10	0.01	0.05	132.00	999.99	999.99
011274	4.40	0.01	0.03	60.00	999.99	999.99
011374	2.70	0.0	0.03	55.00	999.99	999.99
011474	10.50	0.0	0.05	122.00	999.99	999.99
011574	14.40	0.01	0.06	126.00	999.99	999.99
011674	19.10	0.04	0.06	113.00	999.99	999.99
011774	3.90	0.01	0.03	68.00	999.99	999.99
011874	9.30	0.01	0.05	171.00	999.99	999.99
011974	6.00	0.01	0.04	118.00	999.99	999.99
012074	4.40	0.01	0.05	103.00	999.99	999.99
012174	15.70	0.01	0.05	97.00	999.99	999.99
012274	9.50	0.01	0.04	73.00	999.99	999.99
012374	11.90	0.01	0.07	155.00	999.99	999.99
012474	3.70	0.01	0.04	47.00	999.99	999.99
012574	10.70	0.01	0.05	92.00	999.99	999.99
012674	10.10	0.01	0.06	226.00	999.99	999.99
012774	8.30	0.01	0.04	52.00	999.99	999.99
012874	6.90	0.01	0.07	122.00	999.99	999.99
012974	5.00	0.01	0.04	53.00	999.99	999.99
013074	11.20	0.01	0.08	179.00	999.99	999.99
013174	9.70	0.01	0.07	174.00	999.99	999.99
020174	3.70	0.01	0.02	55.00	999.99	999.99
020274	4.00	999.99	0.04	131.00	999.99	999.99
020374	2.10	999.99	0.03	91.00	999.99	999.99
020474	2.70	0.01	0.03	73.00	999.99	999.99
020574	2.60	0.01	0.01	37.00	999.99	999.99
020674	6.50	0.01	0.05	126.00	999.99	999.99
020774	4.40	0.01	0.04	184.00	999.99	999.99
020874	5.00	0.01	0.03	64.00	999.99	999.99
020974	2.50	0.01	0.03	61.00	999.99	999.99
021074	3.60	999.99	999.99	97.00	999.99	999.99
021174	2.90	0.02	0.02	71.00	999.99	999.99
021274	6.30	0.01	0.03	112.00	999.99	999.99
021374	12.50	0.01	0.05	190.00	999.99	999.99
021474	3.40	0.01	0.03	78.00	999.99	999.99
021574	4.00	0.01	0.04	88.00	999.99	999.99
021674	4.00	0.01	0.04	154.00	999.99	999.99
021774	1.50	0.02	0.01	52.00	999.99	999.99
021874	4.00	0.02	0.02	58.00	999.99	999.99
021974	5.00	0.01	0.03	132.00	999.99	999.99
022074	3.10	0.01	0.02	98.00	999.99	999.99
022174	6.00	0.01	0.05	129.00	999.99	999.99
022274	6.10	0.02	0.03	97.00	999.99	999.99
022374	999.99	999.99	999.99	999.99	999.99	999.99
022474	999.99	999.99	999.99	999.99	999.99	999.99
022574	1.70	999.99	999.99	999.99	999.99	999.99
022674	2.70	999.99	0.02	71.00	999.99	999.99
022774	7.50	999.99	0.05	111.00	999.99	999.99
022874	7.30	999.99	0.05	130.00	999.99	999.99
030174	3.30	0.01	0.01	68.00	999.99	999.99

61	010274	5.90	0.01	0.05	94.00	999.99	999.99
62	030374	4.90	0.01	0.05	126.00	999.99	999.99
63	030374	17.50	0.02	0.01	142.00	999.99	999.99
64	030574	3.80	0.01	0.04	32.00	999.99	999.99
65	030674	7.20	0.01	0.06	69.00	999.99	999.99
66	030774	6.90	0.01	0.05	70.00	999.99	999.99
67	030874	5.00	0.01	0.05	55.00	999.99	999.99
68	030974	6.10	0.01	0.05	98.00	999.99	999.99
69	031074	1.50	999.99	999.99	999.99	999.99	999.99
70	031174	3.10	0.01	0.03	51.00	999.99	999.99
71	031274	2.30	0.01	0.04	58.00	999.99	999.99
72	031374	1.70	999.99	0.03	999.99	999.99	999.99
73	031474	999.99	999.99	999.99	999.99	999.99	999.99
74	031574	4.90	999.99	999.99	999.99	999.99	999.99
75	031674	5.90	0.01	0.05	83.00	999.99	999.99
76	031774	2.00	0.01	0.01	41.00	999.99	999.99
77	031874	4.50	999.99	0.03	36.00	999.99	999.99
78	031974	5.70	0.01	0.05	999.99	999.99	999.99
79	032074	5.10	0.01	0.07	999.99	999.99	999.99
80	032174	4.10	999.99	0.04	79.00	999.99	999.99
81	032274	7.00	999.99	0.04	72.00	999.99	999.99
82	032374	4.50	0.01	0.06	95.00	999.99	999.99
83	032474	3.00	999.99	0.04	60.00	999.99	999.99
84	032574	6.00	999.99	0.04	67.00	999.99	999.99
85	032674	8.50	0.01	0.04	140.00	999.99	999.99
86	032774	3.10	999.99	0.04	51.00	999.99	999.99
87	032874	2.10	999.99	0.04	47.00	999.99	999.99
88	032974	9.40	0.01	0.06	112.00	999.99	999.99
89	033074	4.00	999.99	0.04	65.00	999.99	999.99
90	033174	3.00	999.99	0.02	36.00	999.99	999.99
91	040174	5.60	0.01	0.04	59.00	999.99	999.99
92	040274	6.30	0.02	0.08	999.99	999.99	999.99
93	040374	999.99	999.99	999.99	999.99	999.99	999.99
94	040474	6.30	999.99	999.99	999.99	999.99	999.99
95	040574	5.90	0.01	0.04	34.00	999.99	999.99
96	040674	4.40	999.99	0.03	38.00	999.99	999.99
97	040774	3.30	0.01	0.05	57.00	999.99	999.99
98	040874	5.70	0.01	0.06	60.00	999.99	999.99
99	040974	3.10	0.01	0.04	48.00	999.99	999.99
100	041074	3.50	0.01	0.04	48.00	999.99	999.99
101	041174	5.80	0.01	0.06	57.00	999.99	999.99
102	041274	6.20	0.01	0.09	114.00	999.99	999.99
103	041374	12.20	0.01	0.07	113.00	999.99	999.99
104	041474	4.80	999.99	0.05	999.99	999.99	999.99
105	041574	2.90	0.01	0.03	999.99	999.99	999.99
106	041674	2.90	0.01	0.03	29.00	999.99	999.99
107	041774	5.50	999.99	0.05	999.99	999.99	999.99
108	041874	3.90	999.99	0.06	67.00	999.99	999.99
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112	042274	7.00	0.01	0.08	999.99	999.99	999.99
113	042374	5.20	0.01	0.04	17.00	999.99	999.99
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118	042874	4.60	0.01	0.06	25.00	999.99	999.99
119	042974	7.60	0.01	0.07	21.00	999.99	999.99
120	043074	3.60	0.01	0.06	14.00	999.99	999.99
121	050174	2.50	0.03	0.04	18.00	999.99	999.99

122	050274	4.00	0.03	0.05	25.00	999.99	999.99
123	050374	7.60	0.01	0.06	39.00	999.99	999.99
124	050474	2.50	0.02	0.03	16.00	999.99	999.99
125	050574	1.50	0.02	0.04	15.00	999.99	999.99
126	050674	5.00	0.01	0.06	32.00	999.99	999.99
127	050774	4.30	0.02	0.04	28.00	999.99	999.99
128	050874	3.80	0.02	0.06	34.00	999.99	999.99
129	050974	3.10	0.03	0.07	35.00	80.00	2800.00
130	051074	6.80	0.01	0.09	52.00	999.99	999.99
131	051174	4.30	0.04	0.05	36.00	999.99	999.99
132	051274	2.80	0.04	0.04	34.00	999.99	999.99
133	051374	3.50	0.03	0.04	21.00	999.99	999.99
134	051474	6.40	0.02	0.07	51.00	999.99	999.99
135	051574	5.90	0.04	0.06	34.00	999.99	999.99
136	051674	4.10	0.06	0.08	999.99	999.99	999.99
137	051774	5.70	0.04	0.06	37.00	999.99	999.99
138	051874	4.10	0.04	0.05	32.00	999.99	999.99
139	051974	2.50	0.03	0.04	32.00	999.99	999.99
140	052074	3.10	0.03	0.07	32.00	999.99	999.99
141	052174	5.70	0.04	0.14	40.00	999.99	999.99
142	052274	7.00	0.04	0.07	34.00	999.99	999.99
143	052374	10.50	0.01	0.24	51.00	91.00	4743.00
144	052474	5.10	999.99	0.07	31.00	999.99	999.99
145	052574	3.90	0.01	0.05	18.00	999.99	999.99
146	052674	2.70	0.01	0.03	14.00	999.99	999.99
147	052774	2.70	999.99	0.05	18.00	999.99	999.99
148	052874	3.30	0.01	0.04	18.00	999.99	999.99
149	052974	6.60	0.01	0.07	23.00	999.99	999.99
150	053074	7.30	0.01	0.07	42.00	999.99	999.99
151	053174	5.00	0.01	0.06	28.00	999.99	999.99
152	060174	6.10	0.01	0.06	999.99	999.99	999.99
153	060274	4.10	0.01	0.07	999.99	999.99	999.99
154	060374	6.70	0.01	0.07	999.99	999.99	999.99
155	060474	11.10	0.01	0.07	50.00	999.99	999.99
156	060574	8.70	0.02	0.06	48.00	86.00	3440.00
157	060674	4.80	0.03	0.05	57.00	999.99	999.99
158	060774	5.10	0.01	0.04	91.00	999.99	999.99
159	060874	6.80	0.01	0.05	86.00	999.99	999.99
160	060974	6.00	0.02	0.04	50.00	999.99	999.99
161	061074	5.20	0.02	0.04	32.00	999.99	999.99
162	061174	4.30	0.01	0.03	23.00	999.99	999.99
163	061274	5.70	0.01	0.04	42.00	999.99	999.99
164	061374	4.80	0.01	0.06	47.00	999.99	999.99
165	061474	6.20	0.01	0.06	33.00	999.99	999.99
166	061574	3.80	0.02	0.05	27.00	999.99	999.99
167	061674	1.90	0.02	0.02	13.00	59.00	767.00
168	061774	5.90	0.01	0.05	26.00	999.99	999.99
169	061874	4.40	0.01	0.06	999.99	999.99	999.99
170	061974	6.10	0.02	0.06	35.00	999.99	999.99
171	062074	7.30	0.03	0.05	21.00	999.99	999.99
172	062174	11.40	0.01	0.08	40.00	999.99	999.99
173	062274	5.50	0.02	0.04	16.00	999.99	999.99
174	062374	4.50	0.01	0.04	11.00	999.99	999.99
175	062474	5.50	0.01	0.05	15.00	999.99	999.99
176	062574	6.20	0.01	0.05	14.00	999.99	999.99
177	062674	6.10	0.01	0.06	28.00	999.99	999.99
178	062774	5.50	0.01	0.07	58.00	62.00	3596.00
179	062874	5.90	0.01	0.05	25.00	999.99	999.99
180	062974	6.60	0.02	0.05	25.00	999.99	999.99
181	063074	4.00	0.03	0.03	28.00	999.99	999.99
182	070174	5.20	0.02	0.04	18.00	999.99	999.99

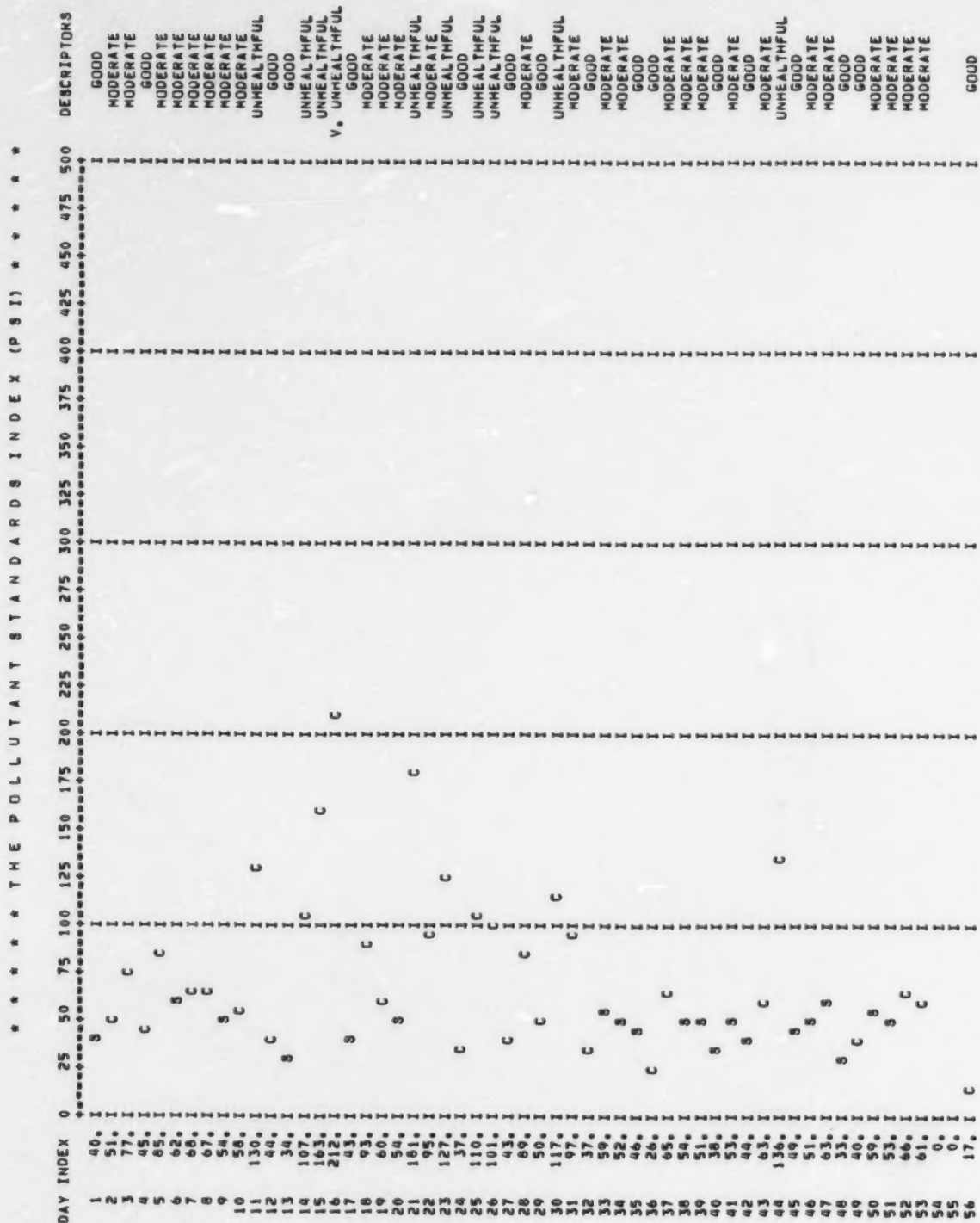
183	070374	8.20	0.03	0.06	24.00	999.99	999.99
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185	070474	5.70	0.04	0.04	47.00	999.99	999.99
186	070574	8.70	0.01	0.06	42.00	999.99	999.99
187	070674	5.10	0.02	0.05	35.00	999.99	999.99
188	070774	4.00	0.03	0.03	14.00	999.99	999.99
189	070874	4.10	0.02	0.04	19.00	999.99	999.99
190	070974	4.40	0.04	0.04	25.00	999.99	999.99
191	071074	4.20	0.03	0.04	32.00	999.99	999.99
192	071174	2.90	0.01	0.02	14.00	999.99	999.99
193	071274	3.70	0.01	0.03	14.00	999.99	999.99
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195	071474	4.50	0.06	0.03	19.00	999.99	999.99
196	071574	4.20	0.04	0.03	25.00	999.99	999.99
197	071674	3.20	0.02	0.03	13.00	999.99	999.99
198	071774	3.60	0.03	0.04	16.00	999.99	999.99
199	071874	7.40	0.02	0.06	32.00	999.99	999.99
200	071974	4.70	0.03	0.04	19.00	999.99	999.99
201	072074	3.20	0.02	0.02	11.00	999.99	999.99
202	072174	4.70	0.03	0.04	21.00	999.99	999.99
203	072274	5.20	0.03	0.07	26.00	999.99	999.99
204	072374	5.10	0.01	0.05	40.00	999.99	999.99
205	072474	6.10	0.01	0.06	26.00	999.99	999.99
206	072574	5.40	0.01	0.06	27.00	999.99	999.99
207	072674	5.50	0.01	0.07	999.99	999.99	999.99
208	072774	6.90	0.02	0.07	31.00	999.99	999.99
209	072874	5.30	0.02	0.06	47.00	999.99	999.99
210	072974	6.10	0.01	0.04	30.00	999.99	999.99
211	073074	6.00	0.03	0.04	16.00	999.99	999.99
212	073174	6.60	0.03	0.06	21.00	999.99	999.99
213	080174	6.60	0.03	0.06	42.00	999.99	999.99
214	080274	7.60	0.02	0.11	46.00	999.99	999.99
215	080374	7.50	0.01	0.03	21.00	999.99	999.99
216	080474	5.20	0.01	0.02	14.00	999.99	999.99
217	080574	5.90	0.02	0.03	16.00	999.99	999.99
218	080674	5.40	0.03	0.06	28.00	999.99	999.99
219	080774	7.30	0.01	0.07	999.99	999.99	999.99
220	080874	6.60	0.03	0.05	999.99	999.99	999.99
221	080974	6.10	0.02	0.06	999.99	999.99	999.99
222	081074	5.30	0.01	0.04	24.00	999.99	999.99
223	081174	4.70	0.02	0.03	27.00	999.99	999.99
224	081274	6.30	0.03	0.06	29.00	999.99	999.99
225	081374	7.00	0.03	0.09	999.99	999.99	999.99
226	081474	4.60	0.03	0.03	999.99	999.99	999.99
227	081574	5.60	0.02	0.04	20.00	999.99	999.99
228	081674	6.60	0.02	0.07	25.00	999.99	999.99
229	081774	6.60	0.02	0.05	26.00	999.99	999.99
230	081874	3.60	0.03	0.03	13.00	999.99	999.99
231	081974	5.50	0.03	0.06	19.00	999.99	999.99
232	082074	6.40	0.01	0.09	40.00	999.99	999.99
233	082174	6.60	0.01	0.08	39.00	999.99	999.99
234	082274	4.50	0.01	0.04	13.00	999.99	999.99
235	082374	10.10	0.03	0.06	32.00	999.99	999.99
236	082474	6.60	0.02	0.05	32.00	999.99	999.99
237	082574	5.40	0.03	0.02	13.00	999.99	999.99
238	082674	9.20	0.01	0.06	28.00	999.99	999.99
239	082774	11.30	0.02	0.04	22.00	999.99	999.99
240	082874	10.40	0.02	0.06	26.00	999.99	999.99
241	082974	11.00	0.02	0.08	41.00	999.99	999.99
242	083074	7.60	0.01	0.05	15.00	999.99	999.99
243	083174	11.60	0.03	0.06	39.00	999.99	999.99

244	090174	5.30	0.05	0.03	24.00	999.99	999.99
245	090274	6.30	0.01	0.03	14.00	999.99	999.99
246	090374	10.90	0.01	0.08	999.99	999.99	999.99
247	090474	4.40	999.99	0.02	999.99	999.99	999.99
248	090574	8.80	0.01	0.05	13.00	999.99	999.99
249	090674	7.80	0.01	0.07	35.00	999.99	999.99
250	090774	8.30	0.01	0.05	17.00	999.99	999.99
251	090874	7.70	0.03	0.07	48.00	999.99	999.99
252	090974	12.90	0.02	0.08	36.00	2522.00	999.99
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254	091174	14.30	0.02	0.17	38.00	999.99	999.99
255	091274	10.30	0.01	0.06	999.99	999.99	999.99
256	091374	13.00	0.01	0.06	999.99	999.99	999.99
257	091474	5.00	0.01	0.02	13.00	999.99	999.99
258	091574	3.30	0.01	0.03	999.99	999.99	999.99
259	091674	6.60	0.01	0.04	999.99	999.99	999.99
260	091774	9.70	0.01	0.09	50.00	999.99	999.99
261	091874	6.10	0.01	0.05	23.00	999.99	999.99
262	091974	6.30	0.02	0.07	40.00	98.00	999.99
263	092074	15.60	0.01	0.07	41.00	999.99	999.99
264	092174	9.70	0.01	0.05	34.00	999.99	999.99
265	092274	3.70	0.01	0.02	14.00	999.99	999.99
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273	093074	5.10	0.01	999.99	999.99	999.99	999.99
274	101074	6.00	0.01	0.04	26.00	999.99	999.99
275	101074	4.20	0.01	0.04	14.00	12.00	999.99
276	101374	4.40	999.99	0.03	15.00	999.99	999.99
277	101474	13.30	0.01	0.03	36.00	999.99	999.99
278	101574	11.90	0.01	999.99	26.00	999.99	999.99
279	101674	7.50	0.02	999.99	42.00	999.99	999.99
280	101774	10.20	0.01	999.99	999.99	999.99	999.99
281	101874	8.50	0.01	0.05	33.00	999.99	999.99
282	101974	11.60	0.01	0.07	56.00	999.99	999.99
283	101074	10.30	0.01	0.08	999.99	999.99	999.99
284	101174	10.40	0.01	0.08	49.00	999.99	999.99
285	101274	10.90	0.01	0.08	44.00	999.99	999.99
286	101374	4.30	0.01	0.04	28.00	999.99	999.99
287	101474	4.40	0.01	0.03	999.99	999.99	999.99
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289	101674	4.90	999.99	999.99	999.99	38.00	999.99
290	101774	12.90	999.99	999.99	999.99	999.99	999.99
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292	101974	6.20	0.01	0.04	27.00	999.99	999.99
293	102074	3.00	0.01	0.02	999.99	999.99	999.99
294	102174	999.99	999.99	999.99	999.99	999.99	999.99
295	102274	999.99	999.99	999.99	999.99	999.99	999.99
296	102374	999.99	999.99	999.99	999.99	999.99	999.99
297	102474	999.99	999.99	999.99	999.99	999.99	999.99
298	102574	999.99	999.99	999.99	999.99	999.99	999.99
299	102674	999.99	999.99	999.99	999.99	999.99	999.99
300	102774	999.99	999.99	999.99	999.99	999.99	999.99
301	102874	7.50	999.99	999.99	999.99	999.99	999.99
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306	110274	9.40	0.01	0.03	20.00	999.99	999.99
307	110374	9.00	0.01	0.03	35.00	999.99	999.99
308	110474	13.60	0.01	0.05	48.00	999.99	999.99
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310	110674	6.00	0.01	0.02	999.99	999.99	999.99
311	110774	6.40	0.01	0.02	34.00	999.99	999.99
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313	110974	5.50	0.02	0.02	26.00	999.99	999.99
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315	111174	6.20	999.99	999.99	999.99	999.99	999.99
316	111274	14.20	999.99	999.99	999.99	999.99	999.99
317	111374	11.60	999.99	0.05	66.00	999.99	999.99
318	111474	6.00	0.01	0.04	999.99	999.99	999.99
319	111574	7.50	0.01	0.05	78.00	999.99	999.99
320	111674	13.50	0.01	0.08	146.00	999.99	999.99
321	111774	16.20	0.01	0.07	146.00	999.99	999.99
322	111874	13.70	0.01	0.20	84.00	999.99	999.99
323	111974	7.00	0.01	0.05	65.00	999.99	999.99
324	112074	5.60	0.01	0.03	35.00	999.99	999.99
325	112174	13.10	0.01	0.03	18.00	999.99	999.99
326	112274	12.70	0.01	0.07	72.00	999.99	999.99
327	112374	11.60	0.01	0.06	92.00	999.99	999.99
328	112474	4.90	0.01	0.06	71.00	999.99	999.99
329	112574	10.10	0.01	0.02	13.00	999.99	999.99
330	112674	3.70	0.01	0.05	52.00	999.99	999.99
331	112774	5.50	0.01	0.05	118.00	999.99	999.99
332	112874	5.60	0.01	0.03	41.00	999.99	999.99
333	112974	2.10	0.02	0.05	54.00	999.99	999.99
334	113074	2.10	0.01	0.02	999.99	999.99	999.99
335	120174	1.90	0.01	0.03	42.00	999.99	999.99
336	120274	1.70	999.99	0.06	999.99	999.99	999.99
337	120374	7.40	0.01	0.06	165.00	999.99	999.99
338	120474	4.80	0.02	0.06	113.00	999.99	999.99
339	120574	6.70	0.01	0.02	28.00	999.99	999.99
340	120674	2.10	0.01	0.03	45.00	999.99	999.99
341	120774	6.60	999.99	0.03	50.00	999.99	999.99
342	120874	10.10	0.01	999.99	999.99	999.99	999.99
343	120974	1.10	0.01	0.06	999.99	999.99	999.99
344	121074	7.50	0.01	0.06	57.00	999.99	999.99
345	121174	2.60	999.99	0.07	83.00	999.99	999.99
346	121274	1.20	999.99	999.99	999.99	999.99	999.99
347	121374	4.60	0.01	999.99	999.99	999.99	999.99
348	121474	6.30	999.99	0.02	65.00	999.99	999.99
349	121574	3.60	999.99	0.03	999.99	999.99	999.99
350	121674	5.60	999.99	0.03	63.00	999.99	999.99
351	121774	7.60	999.99	0.03	97.00	999.99	999.99
352	121874	3.00	999.99	0.04	77.00	999.99	999.99
353	121974	3.20	999.99	0.05	112.00	999.99	999.99
354	122074	11.20	0.01	0.03	999.99	999.99	999.99
355	122174	5.20	999.99	0.04	999.99	999.99	999.99
356	122274	2.80	0.01	0.07	72.00	999.99	999.99
357	122374	3.60	0.01	0.03	49.00	999.99	999.99
358	122474	6.00	999.99	0.03	47.00	999.99	999.99
359	122574	2.40	0.01	0.04	102.00	999.99	999.99
360	122674	2.00	999.99	0.04	50.00	999.99	999.99
361	122774	6.00	999.99	999.99	999.99	999.99	999.99
362	122874	11.00	999.99	0.03	66.00	999.99	999.99
363	122974		999.99	0.04	80.00	999.99	999.99
364	123074		999.99			999.99	999.99
365	123174		999.99			999.99	999.99

OF 365 RECORDS, THE FOLLOWING MISSING VALUES WERE OBSERVED:

CO MISSING VALUES: 13
O3 MISSING VALUES: 75
NO2 MISSING VALUES: 39
SO2 MISSING VALUES: 76
TSP MISSING VALUES: 338



57	GOOD
58	MODERATE
59	MODERATE
60	GOOD
61	MODERATE
62	MODERATE
63	UNHEALTHFUL
64	GOOD
65	MODERATE
66	MODERATE
67	GOOD
68	MODERATE
69	GOOD
70	GOOD
71	GOOD
72	GOOD
73	GOOD
74	GOOD
75	GOOD
76	GOOD
77	GOOD
78	MODERATE
79	MODERATE
80	MODERATE
81	MODERATE
82	MODERATE
83	MODERATE
84	MODERATE
85	MODERATE
86	MODERATE
87	MODERATE
88	MODERATE
89	MODERATE
90	MODERATE
91	MODERATE
92	MODERATE
93	MODERATE
94	MODERATE
95	MODERATE
96	MODERATE
97	MODERATE
98	MODERATE
99	MODERATE
100	MODERATE
101	MODERATE
102	MODERATE
103	MODERATE
104	MODERATE
105	MODERATE
106	MODERATE
107	MODERATE
108	MODERATE
109	MODERATE
110	MODERATE
111	MODERATE
112	MODERATE
113	MODERATE
114	MODERATE
115	MODERATE
116	MODERATE
117	MODERATE

179	59.	I	MODERATE
180	66.	I	MODERATE
181	40.	I	GOOD
182	52.	I	MODERATE
183	82.	I	MODERATE
184	93.	I	MODERATE
185	57.	I	MODERATE
186	87.	I	MODERATE
187	51.	I	MODERATE
188	40.	I	MODERATE
189	41.	I	MODERATE
190	50.	I	MODERATE
191	42.	I	GOOD
192	26.	I	GOOD
193	37.	I	GOOD
194	29.	I	GOOD
195	75.	I	GOOD
196	50.	I	MODERATE
197	32.	I	GOOD
198	38.	I	GOOD
199	74.	I	GOOD
200	47.	I	MODERATE
201	32.	I	GOOD
202	47.	I	GOOD
203	52.	I	GOOD
204	51.	I	MODERATE
205	61.	I	MODERATE
206	54.	I	MODERATE
207	55.	I	MODERATE
208	69.	I	MODERATE
209	53.	I	MODERATE
210	61.	I	MODERATE
211	60.	I	MODERATE
212	66.	I	MODERATE
213	66.	I	MODERATE
214	76.	I	MODERATE
215	75.	I	MODERATE
216	52.	I	MODERATE
217	59.	I	MODERATE
218	54.	I	MODERATE
219	73.	I	MODERATE
220	66.	I	MODERATE
221	61.	I	MODERATE
222	53.	I	MODERATE
223	47.	I	MODERATE
224	63.	I	MODERATE
225	70.	I	MODERATE
226	40.	I	MODERATE
227	56.	I	MODERATE
228	66.	I	MODERATE
229	66.	I	MODERATE
230	38.	I	MODERATE
231	55.	I	MODERATE
232	84.	I	MODERATE
233	86.	I	MODERATE
234	45.	I	MODERATE
235	101.	I	GOOD
236	66.	I	UNHEALTHFUL
237	54.	I	MODERATE
238	92.	I	MODERATE
239	119.	I	UNHEALTHFUL

301	75.	1	MODERATE
302	0.	1	UNHEALTHFUL
303	116.	1	V. UNHEALTHFUL
304	207.	1	UNHEALTHFUL
305	161.	1	MODERATE
306	94.	1	MODERATE
307	90.	1	UNHEALTHFUL
308	151.	1	MODERATE
309	0.	1	MODERATE
310	60.	1	MODERATE
311	64.	1	MODERATE
312	60.	1	MODERATE
313	59.	1	MODERATE
314	55.	1	MODERATE
315	55.	1	MODERATE
316	62.	1	MODERATE
317	160.	1	UNHEALTHFUL
318	123.	1	UNHEALTHFUL
319	66.	1	MODERATE
320	75.	1	MODERATE
321	77.	1	MODERATE
322	150.	1	MODERATE
323	169.	1	UNHEALTHFUL
324	151.	1	UNHEALTHFUL
325	70.	1	UNHEALTHFUL
326	56.	1	MODERATE
327	144.	1	MODERATE
328	139.	1	MODERATE
329	126.	1	UNHEALTHFUL
330	49.	1	UNHEALTHFUL
331	101.	1	GOOD
332	57.	1	UNHEALTHFUL
333	55.	1	MODERATE
334	56.	1	MODERATE
335	25.	1	MODERATE
336	28.	1	MODERATE
337	18.	1	MODERATE
338	19.	1	MODERATE
339	101.	1	MODERATE
340	167.	1	UNHEALTHFUL
341	74.	1	UNHEALTHFUL
342	48.	1	MODERATE
343	67.	1	MODERATE
344	31.	1	MODERATE
345	66.	1	MODERATE
346	101.	1	MODERATE
347	75.	1	MODERATE
348	26.	1	MODERATE
349	12.	1	MODERATE
350	46.	1	MODERATE
351	63.	1	MODERATE
352	39.	1	MODERATE
353	56.	1	MODERATE
354	76.	1	MODERATE
355	58.	1	MODERATE
356	32.	1	MODERATE
357	117.	1	MODERATE
358	52.	1	MODERATE
359	31.	1	MODERATE
360	44.	1	MODERATE
361	60.	1	MODERATE

SUMMARY OF RESULTS BY SUBINDEX AND BY DESCRIPTOR:

	GOOD	MODERATE	UNHEALTHFUL	V. UNHEALTHFUL	HAZARDOUS	TOTAL
COI	139	157	52	4	0	352
O3I	287	3	0	0	0	290
NO2I	326	0	0	0	0	326
SO2I	229	60	0	0	0	289
TSP	16	11	0	0	0	27
TSPXSO2I	23	0	0	0	0	23
PSI	121	176	52	4	0	353

RESULTS EXPRESSED AS A PERCENTAGE:

	GOOD	MODERATE	UNHEALTHFUL	V. UNHEALTHFUL	HAZARDOUS	TOTAL
COI	39.5	44.6	14.8	1.1	0.0	100.0
O3I	99.0	1.0	0.0	0.0	0.0	100.0
NO2I	100.0	0.0	0.0	0.0	0.0	100.0
SO2I	79.2	20.8	0.0	0.0	0.0	100.0
TSP	59.3	40.7	0.0	0.0	0.0	100.0
TSPXSO2I	100.0	0.0	0.0	0.0	0.0	100.0
PSI	34.3	49.9	14.7	1.1	0.0	100.0

SUMMARY OF CRITICAL POLLUTANTS (POLLUTANTS FOR WHICH SUBINDEX WAS MAXIMUM):

POLLUTANT	NO. OF VALUES	PERCENT
CO	292	82.7
O3	15	4.2
NO2	0	0.0
SO2	40	11.3
TSP	6	1.7
TSPXSO2	0	0.0
TOTAL	353	100.0
MISSING	12	

N = 353

MEAN = 67.4978180

2ND MOMENT (VAR.) = 1309.10791 STANDARD DEV. = 36.1815948

COEFFICIENT OF VARIATION = 0.5360490

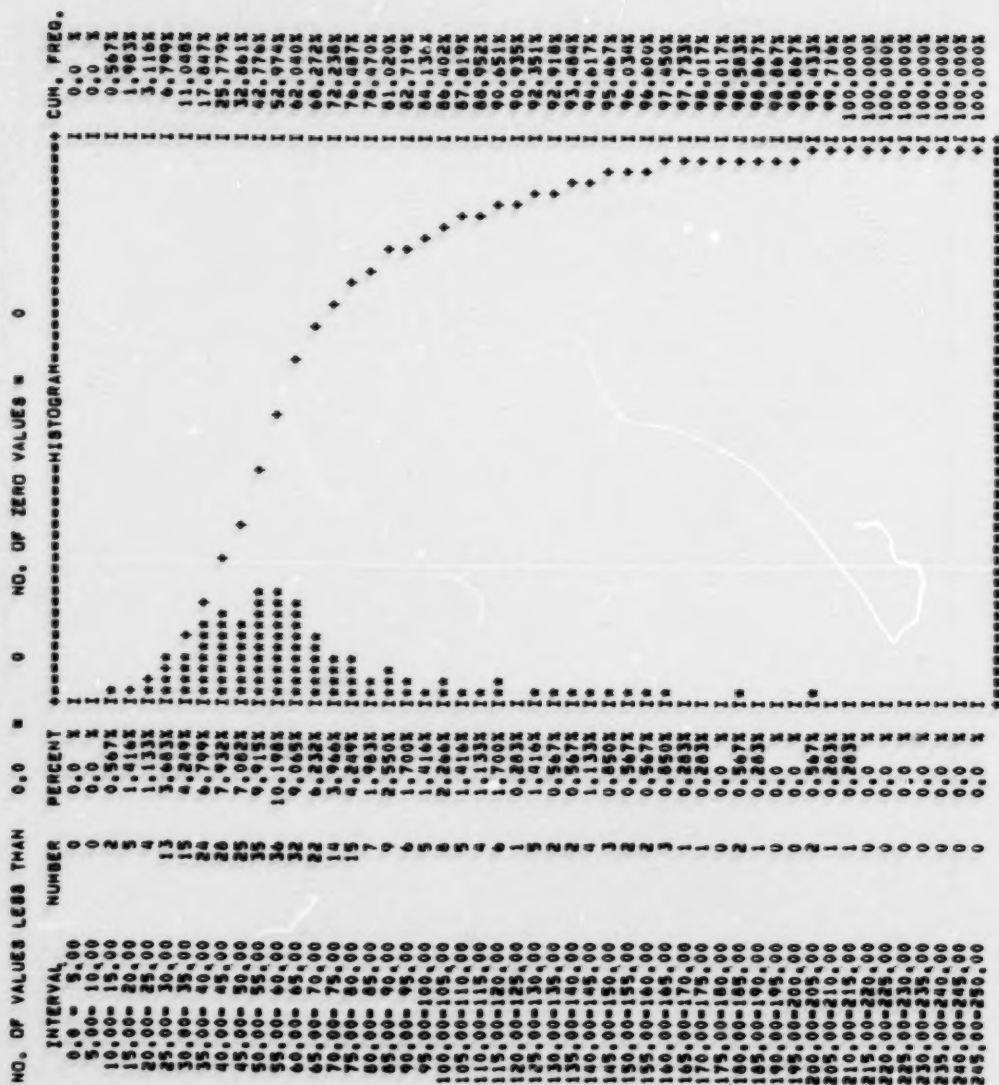
3RD MOMENT = 74408.1250 COEF. OF SKEWNESS = 1.57093143

4TH MOMENT = 9576928.00 COEF. OF KURTOSIS = 5.58824444

LOWEST VALUE = 11.0000001

HIGHEST VALUE = 212.352964

* * * DISTRIBUTION OF DATA (INTERVAL WIDTH = 5.0000) * * *



INTERVAL	NUMBER	PERCENT	HISTOGRAM	CUM. FREQ.
250.00-255.00	0	0.0	I	+I 100.000X
255.00-260.00	0	0.0	I	+I 100.000X
260.00-265.00	0	0.0	I	+I 100.000X
265.00-270.00	0	0.0	I	+I 100.000X
270.00-275.00	0	0.0	I	+I 100.000X
275.00-280.00	0	0.0	I	+I 100.000X
280.00-285.00	0	0.0	I	+I 100.000X
285.00-290.00	0	0.0	I	+I 100.000X
290.00-295.00	0	0.0	I	+I 100.000X
295.00-300.00	0	0.0	I	+I 100.000X
300.00-305.00	0	0.0	I	+I 100.000X
305.00-310.00	0	0.0	I	+I 100.000X
310.00-315.00	0	0.0	I	+I 100.000X
315.00-320.00	0	0.0	I	+I 100.000X
320.00-325.00	0	0.0	I	+I 100.000X
325.00-330.00	0	0.0	I	+I 100.000X
330.00-335.00	0	0.0	I	+I 100.000X
335.00-340.00	0	0.0	I	+I 100.000X
340.00-345.00	0	0.0	I	+I 100.000X
345.00-350.00	0	0.0	I	+I 100.000X
350.00-355.00	0	0.0	I	+I 100.000X
355.00-360.00	0	0.0	I	+I 100.000X
360.00-365.00	0	0.0	I	+I 100.000X
365.00-370.00	0	0.0	I	+I 100.000X
370.00-375.00	0	0.0	I	+I 100.000X
375.00-380.00	0	0.0	I	+I 100.000X
380.00-385.00	0	0.0	I	+I 100.000X
385.00-390.00	0	0.0	I	+I 100.000X
390.00-395.00	0	0.0	I	+I 100.000X
395.00-400.00	0	0.0	I	+I 100.000X
400.00-405.00	0	0.0	I	+I 100.000X
405.00-410.00	0	0.0	I	+I 100.000X
410.00-415.00	0	0.0	I	+I 100.000X
415.00-420.00	0	0.0	I	+I 100.000X
420.00-425.00	0	0.0	I	+I 100.000X
425.00-430.00	0	0.0	I	+I 100.000X
430.00-435.00	0	0.0	I	+I 100.000X
435.00-440.00	0	0.0	I	+I 100.000X
440.00-445.00	0	0.0	I	+I 100.000X
445.00-450.00	0	0.0	I	+I 100.000X
450.00-455.00	0	0.0	I	+I 100.000X
455.00-460.00	0	0.0	I	+I 100.000X
460.00-465.00	0	0.0	I	+I 100.000X
465.00-470.00	0	0.0	I	+I 100.000X
470.00-475.00	0	0.0	I	+I 100.000X
475.00-480.00	0	0.0	I	+I 100.000X
480.00-485.00	0	0.0	I	+I 100.000X
485.00-490.00	0	0.0	I	+I 100.000X
490.00-495.00	0	0.0	I	+I 100.000X
495.00-500.00	0	0.0	I	+I 100.000X

NO. OF VALUES EQUAL TO OR GREATER THAN 500.0000 = 0 (0.0 %)

APPENDIX C

RAW DATA FILE FOR NEWARK, NEW JERSEY, 1974

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313480002F01 NEWARK NJ	CO-MG/M3	OX-PPM	NO2-PPM	SO2-UG/M3	TSP-UG/M3
313480002F01 010174	260	00	04	64 C0	99999
313480002F01 010274	510	01	04	34 C0	99999
313480002F01 010374	770	02	07	99999	99999
313480002F01 010474	450	99999	99999	99999	99999
313480002F01 010574	850	01	06	79 C0	99999
313480002F01 010674	430	01	06	148 C0	99999
313480002F01 010774	680	01	05	142 C0	99999
313480002F01 010874	670	01	04	4500	99999
313480002F01 010974	440	01	05	104 C0	99999
313480002F01 011074	580	01	05	112 C0	99999
313480002F01 011174	1210	01	05	132 C0	99999
313480002F01 011274	440	01	03	6000	99999
313480002F01 011374	270	00	03	5500	99999
313480002F01 011474	1050	00	05	122 C0	99999
313480002F01 011574	1440	01	06	126 C0	99999
313480002F01 011674	1910	04	06	11300	99999
313480002F01 011774	390	01	03	66 C0	99999
313480002F01 011874	930	01	05	17100	99999
313480002F01 011974	600	01	04	11800	99999
313480002F01 012074	440	01	05	10300	99999
313480002F01 012174	1570	01	05	97 C0	99999
313480002F01 012274	950	01	04	7300	99999
313480002F01 012374	1190	01	07	155 C0	99999
313480002F01 012474	370	01	04	4700	99999
313480002F01 012574	1070	01	05	9200	99999
313480002F01 012674	1010	01	09	22600	99999
313480002F01 012774	430	01	04	5300	99999
313480002F01 012874	890	01	07	12200	99999
313480002F01 012974	500	01	04	53 C0	99999
313480002F01 013074	1120	01	08	17900	99999
313480002F01 013174	970	01	07	17400	99999
313480002F01 020174	370	01	02	5500	99999
313480002F01 020274	400	99999	04	13100	99999
313480002F01 020374	210	99999	03	91 C0	99999
313480002F01 020474	270	01	03	7300	99999
313480002F01 020574	260	01	01	37 C0	99999
313480002F01 020674	650	01	05	12600	99999
313480002F01 020774	440	01	04	10400	99999
313480002F01 020874	500	01	03	84 C0	99999
313480002F01 020974	250	01	03	6100	99999
313480002F01 021074	380	99999	99999	9700	99999
313480002F01 021174	290	02	02	71 C0	99999
313480002F01 021274	630	01	03	11200	99999
313480002F01 021374	1250	01	05	19000	99999
313480002F01 021474	340	01	03	7800	99999
313480002F01 021574	400	01	04	8800	99999
313480002F01 021674	400	01	04	154 C0	5200
313480002F01 021774	150	02	01	52 C0	99999
313480002F01 021874	400	02	02	5800	99999
313480002F01 021974	560	01	03	132 C0	99999
313480002F01 022074	330	01	02	98 C0	99999
313480002F01 022174	660	01	05	129 C0	99999
313480002F01 022274	610	02	03	9700	99999
313480002F01 022374	99999	99999	99999	99999	99999
313480002F01 022474	99999	99999	99999	99999	99999
313480002F01 022574	170	99999	99999	99999	99999
313480002F01 022674	270	99999	02	7100	99999
313480002F01 022774	750	99999	05	11100	99999

313480002F01	022874	730	99999	05	13000	11500
313480002F01	030174	330	01	01	6800	99999
313480002F01	030274	590	01	05	9400	99999
313480002F01	030374	490	01	05	12600	99999
313480002F01	030474	1750	02	01	14200	99999
313480002F01	030574	380	01	04	3200	99999
313480002F01	030674	720	01	06	8900	99999
313480002F01	030774	690	01	05	7000	99999
313480002F01	030874	500	01	05	5500	99999
313480002F01	030974	630	01	05	9800	99999
313480002F01	031074	150	99999	99999	99999	99999
313480002F01	031174	310	01	03	5100	99999
313480002F01	031274	230	01	04	4500	5800
313480002F01	031374	170	99999	03	99999	99999
313480002F01	031474	99999	99999	99999	99999	99999
313480002F01	031574	490	99999	99999	99999	99999
313480002F01	031674	590	01	05	8300	99999
313480002F01	031774	200	01	01	4100	99999
313480002F01	031874	450	99999	03	3600	99999
313480002F01	031974	570	01	05	99999	99999
313480002F01	032074	510	01	07	99999	99999
313480002F01	032174	430	99999	04	7900	99999
313480002F01	032274	700	99999	04	7200	99999
313480002F01	032374	450	01	06	9500	99999
313480002F01	032474	300	99999	04	6000	3100
313480002F01	032574	600	99999	04	6700	99999
313480002F01	032674	850	01	06	14000	99999
313480002F01	032774	310	99999	04	5100	99999
313480002F01	032874	210	99999	04	4700	99999
313480002F01	032974	940	01	06	11200	99999
313480002F01	033074	400	99999	04	6500	99999
313480002F01	033174	300	99999	02	3600	99999
313480002F01	040174	560	01	04	5900	99999
313480002F01	040274	630	02	08	99999	99999
313480002F01	040374	99999	99999	99999	99999	99999
313480002F01	040474	630	99999	99999	99999	99999
313480002F01	040574	590	01	04	3400	3600
313480002F01	040674	440	99999	03	3800	99999
313480002F01	040774	330	01	05	5700	99999
313480002F01	040874	570	01	06	6000	99999
313480002F01	040974	310	01	04	4600	99999
313480002F01	041074	350	01	04	4200	99999
313480002F01	041174	580	01	06	5700	99999
313480002F01	041274	620	01	09	11400	99999
313480002F01	041374	1220	01	07	11300	99999
313480002F01	041474	400	99999	05	99999	99999
313480002F01	041574	290	01	03	99999	99999
313480002F01	041674	290	01	03	2900	99999
313480002F01	041774	550	99999	05	99999	6700
313480002F01	041874	390	99999	06	3500	99999
313480002F01	041974	520	99999	06	4400	99999
313480002F01	042074	510	99999	99999	99999	99999
313480002F01	042174	400	99999	99999	99999	99999
313480002F01	042274	700	01	08	99999	99999
313480002F01	042374	520	01	04	1700	99999
313480002F01	042474	230	99999	06	1400	99999
313480002F01	042574	130	99999	06	99999	99999
313480002F01	042674	270	01	03	99999	99999
313480002F01	042774	440	01	07	2900	99999
313480002F01	042874	460	01	06	2500	99999

313480002F01	042974	780	01	07	2700	10800
313480002F01	043074	380	01	06	1400	99999
313480002F01	050174	250	03	04	1600	99999
313480002F01	050274	400	03	05	2500	99999
313480002F01	050374	760	01	06	3900	99999
313480002F01	050474	250	02	03	1600	99999
313480002F01	050574	180	02	04	1500	99999
313480002F01	050674	500	01	06	3200	99999
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313480002F01	122874	240	01	04	5000	99999
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313480002F01	123174	1100	99999	04	8000	99999

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